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Wisdom is humble that he knows no more.'—COWPER.

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ELEMENTARY LESSONS IN HORTICULTURE.

BY PROFESSOR J. R. GREEN, M.A.,
Examiner in Botany to the University of Cambridge, and
F. L. GREEN,
Late Science Mistress in the Clifton High School.

III.—THE STEM AND ITS FUNCTIONS: STAKING, PRUNING, GRAFTING.

WE have seen in our examination of a germinating seed that a rudimentary stem lies in the same straight line as the rudimentary root. At its opposite end are borne the first leaves of the plant, the seed leaves, or *cotyledons*, and sometimes, as in the bean, the next leaves can distinctly be seen forming a terminal bud, which is called the *plumule*. Every highly developed plant may be said to consist of two parts—root and shoot. The root, as we have seen, is an outgrowth of the substance of the plant, developed endogenously downwards, and serving the plant mainly as an organ of attachment and nutrition. The shoot may be described briefly as a *stem*, and the different leaves borne by it. By a stem we mean any part of a plant which produces leaves at its growing end.

The rudimentary stem, when a seed germinates in the earth, is readily seen to grow in an upward direction away from the centre of the earth. That this phenomenon is due to the action of gravity is proved by the experiment in which germinating seeds are attached to the edge of a wheel that rotates slowly round a horizontal axis. The plumules, instead of growing in an upward direction, obey the tendency to grow in a straight line, which is inherent in organs, and, like the radicles, tend to grow straight in the directions in which the seedlings were placed when they were attached to the wheel. The slow rotation of the seedlings on the wheel has, in fact, eliminated the action of gravity. The normal direction of the stem, then, like that of the root, results from the action of gravity, but while the root is *geotropic*, growing towards the centre of the earth, the stem grows away from the centre of the earth, and is, therefore, termed *apo-geotropic*.

Let us examine a typical shoot which has forced its way above the surface of the earth. It consists of a *shoot-axis*, or stem, and certain modifications of this organ, called *leaves*. The interdependence of the leaves and their shoot-axes is best seen at the growing point of the shoot. A careful examination will show that the leaves are in reality merely extensions of the substance of the shoot-axis, their tissues being from the first, and during the whole life of the leaf, in complete continuity with the tissue systems of the shoot-axis. While a minute consideration of the structure of the stem would be outside the scope of this paper, some idea of the structure of a dicotyledonous stem may be obtained on cutting sections of a sunflower stem with a sharp knife, and examining them with a lens. Three systems of tissue can be made out. First, the outside skin, or *epidermis*, which is in the sunflower studded with stiff hairs. Some distance below the epidermis the lens shows a circle of *vascular bundles*, which in a cross-section of the stem appear as small oval areas separated by interspaces. The rest of the stem is composed of *ground tissue*, in which three parts are distinguishable—the central *pith*, the *cortex*, lying between the vascular bundles and the epidermis, and the *medullary rays*, which run between the vascular bundles, thus connecting the pith and the cortex. In stems that increase in thickness, the vascular bundles and the medullary rays are found a little below the apex to be traversed by a delicate layer or band of cells, which is known as the *cambium*. This layer causes the increase in thickness by forming new cells in layers before and behind itself. In a monocotyledonous stem, *e.g.*, that of a palm, the vascular bundles, instead of being arranged in a ring, are scattered irregularly through the ground tissue. To show the interdependence of the leaves and their shoot-axes, a longitudinal section of the stem may be made, care being taken to cut through the attachment of a leaf. On the pith being carefully scraped away with a blunt needle, it will be seen that at the *node*, or point from which a leaf is given off, the epidermis of the shoot axis, and also the cortical

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tissue are continued into the leaf. The vascular bundles of the stem are really the lower ends of the vascular bundles which curve out above into the leaves, producing their venation. Leaves, then, are seen to be merely outgrowths of the shoot-axis, but their large development of surface has such an important physiological consequence as to demand for them separate consideration.

On examining our shoot, we shall observe that the leaves come forth very closely, one upon another, at the growing point. In some cases, *e.g.*, the dandelion and daisy, the growth in length of the shoot-axis is so slight that even the completely-formed shoot-axis has no free surface, being quite covered with leaves. More usually, however, with the growth of the shoot-axis, the bases of the leaves, at first closely crowded together, become separated, a piece of the shoot-axis attaining a more or less considerable length between each two super-imposed leaves of the growing point. Such a portion of the shoot-axis is called an *internode*, because it occurs between two nodes. The crowded position of the youngest leaves at the end of the shoot-axis is the explanation of two of the most striking phenomena in shoots, viz., the position of the leaves on their axis, and the formation of buds.

We have already seen that the youngest leaves arise at the growing point so close above, and by the side of one another, that the whole surface of the shoot-axis is covered by them. It follows that with the growth of the leaves mutual pressure necessarily occurs, whence the position assumed by the leaves on their axis.

To understand the formation of *buds*, or growing points of shoots surrounded by their leaves, we must take into consideration, besides the crowded position of the youngest leaves at the end of the shoot-axis, a further fact, viz., the much quicker growth of the leaves as compared with the elongation of the shoot-axis. We have seen in our consideration of the germinating seed, that as soon as any organs become recognisable in the embryo, there arises a bud—the plumule. So in the case of every new shoot, its development, after a growing point has been formed, consists in the development of a bud, which grows out further, either at once, or later. The growing point increases in length very slowly, but the growth of the young leaves is comparatively very vigorous. As leaves are developed in *acropetal succession* (*i.e.*, behind the apex in such a way that the youngest of them lies nearest the apex), each older leaf lying further back from the growing point has a start of all the younger ones. At the same time each older leaf is arched inwards in a concave manner, and envelopes the younger more or less. Leaf thus lies on leaf. As the young shoot unfolds, the leaves expand according to their succession in age, and are thrown outwards, the corresponding internodes being at the same time further developed.

Buds, according to their position, are termed *terminal* or *lateral*. A terminal bud is so called because it lies at the apex of a shoot which has already undergone elongation. Lateral buds are young shoots which are developed laterally upon a growing main shoot. In the higher plants they always originated in the *axil* of a leaf, *i.e.*, in the angle made by a leaf with the internode above the portion of the surface of the stem from which it arises. They are often called *axillary* buds.

While a terminal bud continues the stem that bears it, lateral buds give rise to branches. In the majority of leafy shoots the main shoot-axis continues to grow in its original direction, and produces lateral branches in acropetal succession behind its apex. Sometimes then the primary axis continues to grow more vigorously than the lateral axes, and the lateral axes of the main stem grow more vigorously than the branches borne by them. A good example of this *racemose* branching is found in the Conifers. Their trunk is always more vigorously developed than its lateral branches, while these again are more strongly developed than their lateral branchlets. In other cases, at an early stage each lateral axis begins to grow more vigorously than the primary axis above its point of origin, and the lateral axis becomes more copiously branched than the main axis. Examples of such *cymose* branching may be found in the birch and elm.

When the period of vegetation is interrupted by the arrival of winter, the bud in a few cases maintains its form till, with the coming of spring, the older parts of the bud resume their growth, and new ones are formed at the growing point. In most trees and shrubs, however, specially organised *winter buds* are formed, which may be either terminal or lateral. When a winter bud is about to be formed at the end of a leaf shoot, the development of foliage leaves gives place to the assumption of the form of scales by the leaf rudiments. These scales tightly surround the younger parts, and are often extremely sticky owing to the secretion of a resinous substance. A good example will be found in the winter bud of the horse chestnut. If a longitudinal section be made through the bud, there will be seen inside the overlapping scales the young leaves crowded on the stem and over-lapping its growing point. The scales of winter buds are usually of a yellowish brown colour, simple in structure, without projecting veins, and attached to the stem by a broad base. They may be regarded as the sheaths of leaves, the stalks and blades of which have not developed. In a few cases, as in the fir and pine, the bud scales enclose the apex of the young shoot, which the next period of vegetation will develop into the leaf shoot, in quite an embryonic state. More often, as in the case of fruit trees and the example already taken, the horse chestnut, there will be found within the winter bud not only the end of the young shoot, but a branch system with flower buds and more or less developed foliage leaves, all these parts being so far formed that the warmth of spring in a few days is sufficient for their complete development, after the opening of the bud scales.

With the expansion of the bud, the scales, which must be regarded as the lowest leaves of the shoot, fall off, their protection being no longer needed. As the internodes between them do not lengthen, narrow scars are left behind, forming a band of ridges round the stem. This band marks the commencement of the year's growth. If a well-developed young branch of horse chestnut be carefully observed, the growths of several years may be distinguished by the successive bands of scars left by the bud scales of different seasons. The office of the bud scales is to protect the tender parts enclosed by them from

injury by moisture, and from sudden changes in temperature. The resinous exudation of the scales of the horse chestnut has the effect of warding off moisture more effectually. To guard against sudden changes in temperature, the bud scales are often lined with non-conducting down or wool.

Many buds remain for a time in a *dormant* or undeveloped state. In our forest trees most of the lateral buds generally remain dormant during the first season. They are formed in the axils of the leaves early in the summer, but do not grow into branches till the following spring. Only a part of them grow even then. The undeveloped buds do not, however, necessarily perish. When the more developed buds are destroyed by cold, or otherwise, dormant buds develop in their stead, stimulated by nourishment which the dead buds would have otherwise absorbed. The foliage of trees is thus preserved after a severe frost. Buds which have remained dormant for several years occasionally spring forth from the sides of old stems.

Some buds are *adventitious, i.e.*, they are produced without order and from any part of the stem. They are called adventitious because they are additional to the normal structure of the plant, taking their origin at places where the tissue has already passed over into its permanent condition. Roots are normally destitute of buds, but in certain cases when wounded they do produce them. The roots of the blackberry emit adventitious buds so freely that they are propagated by root cuttings. When a tree is pollarded, or when its trunk is wounded, adventitious buds are especially apt to break out on the sides of the trunk. Adventitious buds often spring from new tissues produced on cut surfaces, a fact of considerable importance in horticulture. We have seen in our consideration of the root that a begonia leaf, used as a cutting, will root from the base of the leaf stalk stuck in the soil, and produce buds on the blade at its junction with the leaf stalk or elsewhere.

Stems are usually aerial, but there are four important kinds of subterranean stems — *rhizomes*, *tubers*, *corms*, and *bulbs*. Rhizomes occur very frequently. They are horizontal or oblique perennial stems, which either lie on the surface of the ground or creep beneath its surface. Wherever they rest on, or are covered by, the soil, they send off fibrous roots, while an aerial stem, either leafy or a flower stalk, is given off from the apex. If the rhizome of the mint be carefully examined, it will be seen that, though popularly termed a creeping root, it is a true stem. The nodes and internodes are clearly perceptible, the former bearing leaves reduced to scales, and the apex arises at length into an ordinary stem. Roots are given off from the nodes, and the destruction of the ascending stem brings into activity the buds formed in the axils of the scale-like leaves. Mint is consequently very difficult to eradicate, the cutting or tearing of the rhizome into pieces by the hoe merely hastening the establishment of as many new plants. We shall presently see that thickened rhizomes frequently occur, and play an important part in the plant's nutrition.

Tubers are thickened underground branches. A good example is afforded by the potato. Their *eyes* are axillary buds, and the leaves, in the axils of which they are borne, have assumed the form of short closely appressed scales. The number of tuberiferous branches may be increased by heaping the soil around the stems. Tubers, like thickened rhizomes, are organs of nutrition.

Corms are subterranean fleshy stems, solid in texture, and of a rounded figure. A good example is the crocus. Some of the buds of a corm grow into new corms, becoming separate individuals, while others develop above ground the season's foliage and flowers. The sheathing bases of one or two leaves enclose the corm with a membraneous scaly coat which readily peels off. It resembles a bulb in appearance.

Bulbs are very fleshy buds, normally subterranean and large, whose axis never elongates. They differ from a corm in their stem being much more abbreviated. In a bulb the stem is reduced to a flat plate, from the lower surface of which roots are produced, and from the upper surface of which leaves are given off which assume the form of scales. Sometimes the scales of a bulb are broad and severally enwrap each other, forming concentric coatings, as in the onion and tulip. In these bulbs, when fresh, they are of a thickish consistency, but become thin when the bulbs are exhausted and dry. If the bulb of a garden lily be now examined, we shall find that its scales do not completely enwrap each other like those of the tulip and onion. They are comparatively narrow, thick and small, and are *imbricated* in arrangement, that is to say, they overlap like the tiles of a house. We shall see in discussing the functions of the stem that bulbs have an important part to play in the plant's nutrition, and also in its propagation.

While shoot-axes are generally easily recognisable, they occasionally assume considerably modified forms. This is especially observable in the case of cacti. In some specimens the shoot-axis resembles a rounded tuber, the places where the leaves have been arrested being marked by tufts of hairs and prickles situated on projecting cushions or ridges. In other cases the shoot-axis assumes a leaf-like form. An important function usually performed by the leaves, that of assimilation [the building up of organic matter through the agency of the green colouring matter], is then undertaken by the shoot-axis. The stem-like nature of the shoot-axes of cacti is shown by their manner of growth, their marked nodes and internodes, and in the majority of cases by the bearing of flowers.

Secondary shoot-axes, or *branches*, sometimes assume a leafy appearance, as in the asparagus. In this plant the leaves of the shoot are reduced to little scales, one at each node, from the axil of which a branch of one internode is developed. That the so-called 'leaves' of the asparagus are modified branches is shown by their axillary origin, and their verfical, instead of horizontal, expansion.

For the purpose of protection, shoot-axes are occasionally modified into *spines* or *thorns*. A thorn is usually a branch, or the termination of a branch, hardened, leafless, and attenuated to a point. This is the case in the hawthorn, where spines are formed in the axils of the leaves, and often produce imperfect leaves and buds. In this tree the spines spring from the main axillary bud, while accessory buds appear, one on each side, and grow the next season into ordinary branches. In the sloe and pear every gradation between a spine and an ordinary branch may be seen. It must not be supposed, however

that all spines are arrested branches. Some spines are of a leafy character. In the holly the ends of the leaf veins are hardened and pointed, the leaf being spiny-toothed. In the barberry every transition may be seen, from the leaf in its normal state to its complete transformation into a spine. Prickles must be carefully distinguished from spines. The so-called 'thorns' of the bramble and rose are not modifications of branches. They are merely prickles, superficial outgrowths from the shoot-axes.

Sometimes, as in the grape vine, Virginian creeper, and passion flower, the shoot-axes assume the form of *tendrils*, *i.e.* of thread-like, leafless bodies, capable of coiling spirally, and serving the plant for the purpose of climbing. In the grape vine and Virginian creeper the uppermost tendril is seen to be a direct continuation of the stem. The small bud which appears in the axil of the uppermost leaf in its growth produces another internode and leaf, and terminates in a similar tendril, the former terminal tendril then becoming lateral and opposite the leaf. In the passion flower the tendrils of the plant are formed in the axils of the leaves. They are leafless, simple branches, composed of one long slender internode, subserving the purpose of climbing. All tendrils, however, are not modifications of shoot-axes. They are in many plants modifications of the leaves. In the sweet pea and vetch one or more leaflets are transformed into tendrils.

We have now to consider the functions performed by the stem in order to understand the horticultural operations connected with it. In the first place, the stem may be regarded as an organ of support, displaying the foliage leaves and reproductive organs. The soft herbaceous shoot-axis of annual plants is called a *stalk*, while the terms *trunk* and *bough* are used to denote stem structures which persist and increase in thickness for several years. Erect stems are more or less firm in texture. Weaker stems use the ground, other stems, or walls as a support.

Stems also play a protective part in the economy of the plant. Spines and prickles keep off grazing animals, and when closely set are of use in defending the plant from the attacks of snails and slugs. Wingless insects are in many cases prevented from reaching the flowers by viscid substances excreted by glandular hairs on the stem.

The stem is an important organ of nutrition. In the first place, it conveys to the leaves the water containing substances in solution which, as we have seen, the root absorbs from the soil. The activity of the root hairs and parenchyma cells of the cortex of the root causes sufficient water to be absorbed to keep these cells in a constantly turgid condition. They then, by the pressure of water within them while the wood cells are empty, force the *crude sap* into the walls of the wood vessels, which readily take up liquid. The crude sap travelling upwards, probably in the walls of the wood vessels, supplies the parenchyma of the upper parts, which is kept turgid by its passage from cell to cell till equilibrium is established. Side by side with this phenomenon of root pressure, another cause operates in facilitating the passage of the ascending or crude sap through the plant. The leaves, as we shall presently see, are organs of transpiration, *i.e.* they give off water into the surrounding air. Crude sap is then absorbed by them from the neighbouring cells, which in their turn absorb it from others, and so on through the plant, a suction current being set up towards the leaves. The stem, then, conveys the crude or unelaborated sap from the root to the leaves. It also conveys the *elaborated sap*, which we shall presently see is formed through the instrumentality of the leaves, to the plant in general. That the elaborated sap traverses the outer part of the stem may easily be seen by an experiment. When a ring of bark is removed from a tree, no growth takes place below the wound, the current of descending elaborated sap being cut off, while growth continues above the wound. So in horticulture, when it is desired to hasten the ripening of fruit on some particular branch of a tree, a ring of bark is removed from the bough, in order that the elaborated sap prevented from passing beyond the wound may be employed in building up the fruit. The stem also aids in the work of nutrition in some instances by becoming thickened, as we have seen, and serving as a store of reserve material.

The stem, or more correctly speaking the shoot, is an organ of reproduction. It has been shown that its power of producing adventitious roots gives rise to the horticultural processes of *layering* and taking *cuttings*. We have now to consider the processes of *budding* and *grafting*. Grafting may be defined as the planting of a shoot in an incision made in another shoot-axis instead of in the ground. Grafting should be performed in the spring, and it is important that the grafts should be taken off before the buds swell and kept fresh in moist earth. The graft, having been tongued for insertion, is then affixed to the stock, or young tree, and tied in. A plaster of clay and horse manure is applied to ensure moisture and nutriment, any cracks which may appear in drying being promptly smoothed over to exclude air. Grafting is resorted to in the case of shrubs and trees which are worthless for horticultural purposes when grown from seeds, as in the case of roses and fruit trees. In 'bottle grafting' a healthy firm young cutting is taken from a good tree and attached to a seedling by inserting one end of the cutting in a bottle of water, while the other is sliced and spliced to the seedling. The water supports the cutting till union with the plant is effected, when the plant is cut down to the point of junction, and the end of the cutting trimmed off close to the stem. Orange trees and vines are often worked in this way.

Budding is an analogous operation to grafting. A bud is first taken from a summer shoot in July or August, when the sap is in an active condition and the buds are well formed. A slit is made in the stock just through the bark, and the bud inserted through the slit is kept in its place by means of ligatures. The stock is cut back the next season. A bud can be transplanted from one tree only into another of the same kind. Thus a bud from an apple tree can be inserted in a crab tree, but it would not grow in a plum tree.

Corms and bulbs are modified underground buds which serve the purpose of reproduction. At least one of these structures is developed every year, and very frequently the main corm or bulb develops several smaller ones in its leaf axils. The small rounded bodies which may be seen in the axils of

the leaves of the tiger lily during the summer are small aerial bulbs which sooner or later fall to the ground, and become fresh individuals. They are called *bulbils* or *bulblets*.

The 'eyes' of the potato are underground buds, by means of which the plant is propagated. When the year's crop is lifted, sound medium-sized tubers should be selected and set on end—the eyes being kept upwards—and laid on shelves in a frost-proof moderately-lighted building. Gradually the eyes will develop into leafy shoots, from the base of which rootlets will be given off.

The stem possesses a certain degree of *irritability*. That is, it takes up its position in response to certain influences which are brought to bear upon it from external forces. Its erect position has been seen to be due to the influence of gravity, which causes it to grow upwards at right angles to the surface of the soil. It is also, when young, acted upon by the incidence of light. When light falls upon it from one side, it gradually bends towards the light source, and continues its growth in that direction so long as the light reaches it from the same point. This form of sensitiveness is known as *heliotropism*. Its effect leads to the leaves it bears being so placed that the light falls upon them at right angles to their surfaces, so enabling them most easily to utilise the gas carbon dioxide which they absorb from the air, in a manner which we shall discuss a little later on.

To recapitulate: we have seen that—

(1.) The *shoot*, as opposed to the root, grows in an upward direction in virtue of the action of gravity.

(2.) A shoot consists of a *shoot-axis*, or stem, and certain modifications of the stem called leaves. The structure of a dicotyledonous stem exhibits three systems of tissue—an outside skin, or *epidermis;* a circle of *vascular bundles;* and *ground tissue*, in which three parts are discernible, the *pith*, the *cortex*, and *medullary rays*. Stems increase in thickness through the activity of the *cambium layer* that traverses the vascular bundles and the medullary rays.

(3.) *Buds* are the growing points of shoots surrounded by their leaves. Their formation arises from the crowded position of the youngest leaves at the end of the shoot-axis, and the fact that while the growing point increases in length very slowly, the growth of the young leaves is very vigorous.

(4.) A *terminal* bud continues the shoot-axis that bears it; *lateral* buds give rise to branches. Winter buds may be either terminal or lateral. Their bud-scales may either enclose the apex of the young shoot in a very rudimentary state, as in the fir, or may contain a branch system with foliage, leaves, and flower buds, as in the horse chestnut. Buds that remain for a considerable time in an undeveloped state are said to be *dormant*. *Adventitious* buds are produced without order from any part of the stem.

(5.) There are four important kinds of underground stems—*rhizomes*, *tubers*, *corms*, and *bulbs*. Though popularly called roots, they are true stems.

(6.) Shoot-axes occasionally assume much modified forms. They may be transformed into *spines* or *thorns*, as in the sloe, or into *tendrils*, as in the grape vine. Occasionally they assume a leafy appearance, as in the asparagus.

(7.) The stem is an organ of support, displaying the foliage leaves and reproductive organs. It also plays a protective part in the economy of the plant.

(8.) The stem is of great importance as an organ of nutrition. It conveys to the leaves the ascending or crude sap absorbed by the root hairs from the soil; it also conveys the sap elaborated by the leaves to the plant in general, and sometimes, as in the case of bulbs and corms, becomes thickened, and serves as a store of reserve material.

(9.) The shoot is an organ of reproduction. Its power of producing adventitious roots gives rise to the horticultural operations of *layering* and taking *cuttings*. In *budding* and *grafting*, a bud or a cutting is transferred to the stem of another plant of the same or some related species, and made to grow there, uniting its wood and bark with those of the stock. Corms and bulbs are modified underground buds serving the purpose of reproduction.

(10.) The stem possesses irritability, responding to the two influences of gravity and light, its ultimate position being taken up in obedience to their combined effect.

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Suitable for 'Unseen Tests' in Reading also.

61.

CAUGHT BY GUILE.—A story describing the unique plan by which a rogue was discovered among the native troops of British India is told by an English officer. A complaint was brought to him of a theft which had just been committed in the barracks, to the perpetrator of which there was not the slightest clue. The next morning, on parade, the colonel passed along the line, giving to each man in turn a thin strip of bamboo, and when all were supplied, he said: 'My men, there is a thief among you, and Brahma has revealed to me a way of detecting him. Come forward, one by one, and give me your bamboo chips, and the guilty man, do what he may, will have the longest.' The soldiers, not a little startled at this mysterious threat, obeyed without a word; but, before the first dozen had filed past, the colonel suddenly seized one of them by the throat, and shouted: 'You are the man!' The Hindoo fell upon his knees, and whined out a confession of the theft. When they had dispersed, another officer, who had been looking on in silent amazement, exclaimed: 'I wish you would teach me that trick, colonel.' 'It is a very simple one,' answered the officer, with a smile. 'You see, these bits of bamboo were all of the same length; but the thief, fearing to get the longest piece, bit off the end of his, just as I expected he would, and that is how I knew him.'

62.

A KNOWING HORSE.—Some amusement has been caused by a story about a horse belonging to a contractor at work in Chatham Dockyard. It appears that a short time ago it slipped on the roadway and fell into a bin or pit that was just alongside. The animal suffered no apparent injury, but could not be induced to make any effort with a view to escaping from its narrow prison. At last it was determined that mechanical means of rescue must be brought into play, so a derrick was sent for, and with some difficulty set up over the hole, slinging gear being provided to hoist the victim. Just as all was ready, and operations were about to begin, the dinner-bell rang. Dobbin pricked up his ears, gave himself a shake, put his fore-foot on the edge, and was out of it in the twinkling of an eye. Then he shambled off quietly to his stable in time for his mid-day feed.

63.

THE COACHMAN AND THE PEAS.—At a dinner party the coachman had come in to help to wait at table. Among the guests was a deaf old lady. The coachman, in handing vegetables, comes to the deaf one. 'Peas, mum?' says John. No answer. 'Peas, mum?' (louder). Still no answer from the deaf lady; but, placing her ear-trumpet to her ear, she lifted it interrogatively to the man, who, glancing down and seeing the tube, ejaculated, 'Well, it is a funny way of taking them, but I suppose she likes it. Here goes.' And down went all the peas into the ear-trumpet.

64.

ORIGIN OF THE PHRASE—'THE GAME NOT WORTH THE CANDLE.'—Peter the Great, while driving in the neighbourhood of Moscow on one occasion, was seized with the pangs of hunger. 'What have we in the hamper?' he asked of his driver. 'There is but one candle left, your Majesty,' replied the man, 'but I think I can exchange it for a fowl at the next farmhouse if you wish.' 'Do so,' replied the Czar, 'for I am famished, and do not care for a light luncheon.' The man laughed, and, as he had surmised, managed the exchange; but the bird was found to be unusually tough. 'I do not think,' said the emperor, later, 'the game was worth the candle.'

65.

THE FARMER'S WILL.—A farmer, on the point of death, called all his sons around his bed. 'My sons,' he said, 'I am dying, and I wish you to inherit all my property. All I have to leave you, you will find buried in the vineyard.' The sons, after their father's funeral, immediately set to work to find the hidden treasure which they supposed their father meant to leave them. They dug up every inch of the vineyard, and left no stone unturned. They found no treasure; but the vines, strengthened by this thorough tillage, yielded the finest vintage that had ever been seen in that vineyard, and repaid the young men for their labour more than fifty-fold. Then the eldest one said, 'I think I see what the old man meant.'

66.

NELSON AND THE BATTLE OF COPENHAGEN.—Nelson won the Battle of Copenhagen through disobedience. At this battle, Nelson was fighting under the orders of Admiral Parker, who at one time considered the day to be lost, and hoisted on board his vessel the signal flag 39, meaning 'stop fighting.' An officer on board Nelson's vessel reported this to his chief, who made no reply. On being told again that number 39 was hoisted, he turned to the officer, saying, 'You know I have only one eye, therefore I have a right to be blind sometimes,' at the same time putting his glass to his blind eye. Then, turning to the officer, he said, 'I really do not see any signal; let mine stand for "close fighting."' The result of this was that the other commanders were encouraged to continue the fight, which ended in a victory to the British arms.

67.

THE DUKE AND THE OLD LADY.—After the Battle of Waterloo, an old lady made up her mind to give Wellington a present, and the most valuable thing which she could spare was a parrot. She had not a little difficulty in getting access to the Duke, but she finally succeeded in reaching his presence, and offered him the parrot. 'I thank you very kindly,' said Wellington, 'but I do not want a parrot.' The old lady turned to the parrot. 'Polly,' said she, 'this is the Duke.' Whereupon the bird exclaimed: 'See, the conquering hero comes!' 'Oh, I'll have her—I'll have her!' said the Duke. And Polly became his property.

68.

A WARNING.—A beadle in one of our country churches was much exercised at the appearance of an old gentleman who, when the sermon was about to begin, took an ear-trumpet in two parts out of his pocket, and began screwing them together. The beadle watched him till the process was completed, and then, going stealthily up, laid his hand on his shoulder and whispered, 'You must not play that here—if ye do I'll turn ye out.'

69.

OUTWITTED.—A rather simple countryman had been induced by a man who imagined himself very clever to promise a fine hen of a particular breed, in exchange for what was said to be a very splendid rose bush. When the rose bush was brought it turned out to be nothing more than a sprig with a little root. The countryman grumbled, but the other said that he only had to wait a few years and it would be a fine bush. He then claimed the hen, but the countryman went to his fowl-house and brought out an egg. 'That is not the fowl you promised me,' said the clever man. 'No,' said the countryman, 'but you have only to wait a year, and it may grow into a fine fowl.'

70.

THE DOG AND THE CANARY.—A lady possessed a great many domestic pets. Among the number was a beautiful canary and a spaniel. The dog's name was Bruce. One day, while giving her bird its morning bath, the lady left the cage-door open. The little creature flew out, and fluttered into the garden. The lady threw up her hands in despair, crying, 'Oh, my bird has gone!' Bruce, who had watched the whole performance, rushed out after the little truant, took it tenderly in his mouth, and restored it to his distressed mistress without ruffling a single feather.

71.

KILLED WITH FRIGHT.—The Duke of Ferrara fell ill, and the doctors declared that only a sudden fright would restore him to health. He was too great a man for anyone to play tricks on, except his fool. One day he was with him in a boat, and cleverly pushed the duke into the water. Aid had been previously provided, and the prince was drawn ashore and put to bed. The fright, the bath, and the bed, cured the invalid, but he was so enraged that he exiled the man, who was both a fool and a physician. Some time after he returned, and the duke, hearing of it, ordered him to be beheaded, but saying privately that he would only repay fright with fright, he directed the executioner not to use the axe, but to let fall a single drop of water on the culprit's neck. The poor fool was led to the scaffold, and all the usual preparations were made. He was blindfolded, and made to lay his head on the block. The executioner from a sponge then let fall a drop of water on his neck, after which, amid shouts and laughter, the jester was bidden to rise and thank the duke for his clemency. But he never moved; he was dead—killed by his master's jest.

72.

HONESTY THE BEST POLICY!—A wealthy citizen of Paris having a fortune of twenty thousand pounds, and no heirs, resolved to bequeath his money to some person who had proved to be perfectly honest. He had retired from business, and spent his time in riding up and down Paris in omnibuses. He always stationed himself near the door of the omnibus, where he would have an opportunity to pass up the fares of passengers, and hand back the change. Frequently, when the change was of a character to admit it, he quietly slipped into it, after the driver had put it into his hand, a silver coin, and awaited the result. The old man rode up and down the streets for eight years, during all of which time not a single passenger upon whom he had bestowed the coin saw fit to restore it to the driver. But at last, one day when he had slipped his usual small silver piece into the change, and passed it to a young working girl who had entered the omnibus, he was delighted to hear her say in a clear voice to the driver, 'Driver, you've given me too much!' The old man said nothing, but made inquiries about the young girl. He made a will, entirely unknown to her, bequeathing her all his property. Lately he died, and the young woman came into possession of her benefactor's fortune of twenty thousand pounds.

73.

AN INGENIOUS EMPEROR.—The late Emperor of Brazil once gave audience to a young engineer who came to show him a new brake for railway engines. The emperor was pleased with it, and said, 'We will put it at once to a practical test. The day after to-morrow have your engine ready, and then we will see how the apparatus works.' At the appointed time the emperor entered his carriage, and the engineer mounted his engine, and on they went for a considerable distance, when the train suddenly came to a sharp curve round the edge of a cliff, on turning which the driver saw, to his horror, an immense boulder lying on the rails. He had just sufficient presence of mind to turn the crank of his brake and pull up the engine within a couple of yards of the block. Here the emperor asked what they were stopping for. They pointed to the piece of rock, on seeing which the emperor burst into a merry laugh. 'Push the thing on one side!' he called out to the engineer, who had jumped down from the locomotive; and when the latter blindly obeyed, and kicked the stone with his foot, it crumpled into dust. It was a block of starch that the emperor had ordered to be placed on the rails the night before.

74.

A CLEVER PONY.—A bright little pony, named Dick, had done a hard morning's work. His master had given him his dinner, and then retired to the village ale-house for a drink, quite forgetting that the pony might also like a drink. The little animal, however, was quite equal to the occasion. At the other end of the village was a pump, and Dick remembered that water sometimes came out of it into a trough underneath. Off he trotted to make investigations. There was no water in the trough, so he deliberately took the pump-handle between his teeth, raised it two or three times until he heard the welcome gurgle of the water, when he dropped the handle and rushed round to the trough, eagerly drinking all there was to be had. This he did several times until his thirst was quenched, when, with a very cheerful air, he frisked back much refreshed to the place where his master had left him.

75.

PLENTY MORE.—An Irishman hearing that London was paved with gold, thought he would take a trip to that city and get a little for himself. He duly arrived at Euston station, and had not proceeded far when he picked up a five-pound note. A man who was passing at the time congratulated him on his good fortune. 'Well, man,' exclaimed Paddy (giving him the note), 'you may have this one for yourself, for shure London is paved with gold, and I shall find plenty more.' However, he did not find them.

76.

FAITHFUL TO THE LAST.—The manager of a woollen mill in the neighbourhood of Huddersfield had a dog which used to go with him to the mill daily. One of the partners used to dine in the office and give the dog bits of his dinner. The firm came to grief last year, the machinery was sold, and the mill closed; but for some time afterwards the dog went as usual daily to the mill, and when he got back home would not eat, and soon after died, it is supposed of a broken heart.

77.

AN ARTFUL DOG.—A dog named Grip was earnestly engaged in discussing a well-garnished bone. Presently a string of dogs came prying down the street. A snarl and a yelp instantly put Grip on the alert. He ran to the corner of the street and cautiously surveyed the approaching prowlers; then, having kept close until they were just upon the point of discovering his ambush, he dashed wildly down the street and instituted a furious pursuit of a purely imaginary something, the whole tribe of dogs taking up the chase and racing madly at his heels. When he had led them, as he evidenly thought, a safe distance past his retreat, Grip gradually relaxed speed, and dropping behind, finally slunk back to the undisturbed enjoyment of his precious bone.

78.

OUTWITTED.—A well-known gentleman entered a grocer's shop the other day, and in a voice loud enough to be heard by the other customers, addressing himself to the shopkeeper, said: 'They tell me, Best, that you have just opened a branch post-office here.' 'Yes, sir,' said Best, 'that is so.' 'So,' continued the wag, 'I suppose you are selling stamps three a penny to work up a connection.' 'No, sir,' said Best; 'I can't quite do that; but I'm selling them three for twopence just at first.' Are you?' said the gent. 'Give me twopennyworth. I can't miss a chance like this,' throwing down two coppers. These the shopkeeper smilingly took up, and, to the delight of the other customers, handed the man one penny and two halfpenny stamps.

79.

HIS REVENGE.—A butcher recently met his neighbour, a baker, who was well known all over the town for his extremely small rolls. The baker inquired, 'Ah, where have you come from?' 'From your shop,' replied the butcher. 'I bought six of your rolls.' 'But where have you put them?' asked the baker. 'Beneath my cap,' replied the butcher; 'there's plenty of room for them.' The baker, on hearing this, went home enraged, and promised himself to return this insult as soon as possible. The next day they met again, when the butcher addressed his neighbour thus: 'Halloa! where have you been?' The baker thought it was now the right time for his revenge, so he replied, 'I came from your shop, where I bought a calf's head.' 'I'm glad to hear that; but what have you done with it?' 'It's beneath my cap!' said the baker, triumphantly.

80.

AN ASTONISHED PACHA.—The Minister of War for Egypt was very particular in regard to the personal appearance of his officers, and issued stringent orders that they should never appear unshaven in public. One day he met in the street a lieutenant who had disregarded his orders. 'Get into my carriage, so that I can carry you to the camp and have you publicly punished,' was the stern command. The young man obeyed, and the two rode along gloomily enough for some time, when the Pacha entered an office, where he was detained for some time on business. Seizing the opportunity, the culprit sprang from the vehicle, darted into a neighbouring barber's, and regained his post minus his beard, before the return of his jailor. For the remainder of the route the officer buried his face in his hands and seemed the picture of apprehension. The camp was reached at last, and all the officers were assembled to witness the degradation of their comrade, who all the while kept well in the rear. 'Come forward, you son of a dog!' cried the angry Pacha, when there stepped before him an officer with a face as clean as a baby's, and a look of the most supreme innocence. His Excellency gave one look of blank astonishment, and then, with a smile breaking over his war-worn features, turned to the assembled officers and said: 'Here, gentlemen, your old Minister is an ass, and your young lieutenant is a captain.'

81.

NOT TO BE CAUGHT.—About a mile from the town of Barnard Castle is a bridge used for crossing the Tees from Durham to Yorkshire, a toll being charged for horses, etc., and one halfpenny for each person walking over. Some time ago a gentleman out walking with his little boy, thinking to take a rise out of the toll-collector, hoisted the child on his back and carried him over, thinking thus to save the toll. On reaching the toll-house, which is at the south end, he said: 'Now, collector, how much this time?' The old man was not to be done, for after scanning his list of tolls for a moment he answered: 'Asses and other beasts of burden are charged twopence.'

NEW READING TESTS.—STANDARD III.

Suitable for 'Unseen Tests' in Dictation also.

65.—Two or three weeks after this there was a cub hunt in the wood near the village. Cubs are baby foxes, and these are found by the hounds, and dug out of their holes and taken away, because otherwise they would grow up and eat all the geese and chickens belonging to the farmers, and so set these good folk grumbling more than ever.—(H.M.I's TEST).

66.—A gentleman in a country town has a small black dog which is very fond of sugar. So his master always puts a lump on the chimney-piece for him at breakfast time. He barks, and jumps, and stands on his hind legs; but it is just out of his reach. So after a few minutes he always goes under the table for a foot-stool, which he pushes along with nose and paws till in the right position, and then stands on it and takes his sugar.

67.—The ostrich does not make a nest; she only scoops a hole in the sand with her bill, and when she is in a wild state will often leave her eggs in the hot sunshine to go in search of food; but when she is regularly fed she never leaves them, unless her mate comes to take her place, which he is sure to do at set times, so that she may walk about and stretch herself.

68.—Whether she thought she would run away from the cruel old woman, or whether she thought at all, nobody knows. She ran down many streets, and then her step grew slower, and she settled into a slow trot, making a plaintive crying noise as she went. At last, besides being wet, cold, and muddy, she grew tired too, and her little bare feet were aching and sore.—(H.M.I's TEST).

69.—A king was hunting one day. Feeling hungry, he sat down to a slight meal. While he was eating, a bee came, seized a morsel of bread, and flew away with it. The king followed the bee, which stopped at a bough of a tree on which was perched a blind sparrow. As soon as it heard the bee's humming, the poor bird opened its beak; whereupon the insect fed the bird, and then flew off.

70.—A little fellow, in turning over the leaves of a scrap-book, came upon the well-known picture of some chickens just out of their shell. He examined the picture carefully, and then, with a grave, sagacious look at the lady who sat beside him, slowly remarked, 'They came out, I expect, because they were afraid of being boiled.'

71.—A goose was once very fond of a house-dog. They sat together near the kennel during the day, only parting at meal-times when the goose went to be fed, returning soon afterwards to its place by the side of its friend. They quite understood each other, for when the dog barked, the goose would run at the offender, and if permitted, she liked to roost with the dog at night instead of with her own companions.

72.—

A queer little boy who had been to school,
And was up to all sorts of tricks,
Discovered that 9, when upside down,
Would pass for the figure 6.
So when asked his age by a good old dame
The comical youngster said:
'I'm 9 when I stand on my feet like this,
But 6 when I stand on my head!'

NEW DICTATION TESTS.—STANDARD IV.

Suitable for 'Unseen Tests' in Reading also.

1.

Bears often cross narrow places in lakes by swimming, and also rivers, and seem to love to take a turn in the water. I once saw one swimming from the mainland to the big island with just a streak of his back out of the water, looking like a log moving along. Sometimes you see only their heads out of water; at other times, half of their bodies is to be seen. We account for this difference by their condition. If fat, the grease helps to buoy them up; if lean, they sink lower in the water.

2.

Although the natives of South Africa are keen hunters, yet they do not care for the hard work of the chase, and so they use all kinds of traps to catch wild animals with the least possible trouble. This is one of their plans for catching antelopes:—A log of wood four feet long, six inches in diameter, with a spear at one end pointing downwards, is fastened to a rope, which is then thrown over the branch of a tree, and the other end is drawn across the path, and tied to a stick. Presently an antelope will come along, but the moment it loosens the rope the log falls, and the animal is wounded by the spear. Its cries soon attract the notice of the natives, who speedily put it out of its misery.

3.

Some of the best known artists of the present day in this country are in the habit of occasionally presenting their intimate friends with Christmas cards of their own painting, which far exceed in value any Christmas cards sold by the dealers in such commodities. The most expensive cards manufactured for sale do not cost more than five guineas, while the great bulk range from five shillings and half-a-crown downwards to six or ten for a penny.

4.

Not long ago, eleven men belonging to a whaling ship were sent off in the small boat to pursue a whale that had been struck by a harpoon off the coast of Greenland. As almost always happens in such cases, the wounded animal darted away at a great pace, dragging the boat rapidly through the water. Then all on a sudden, the whale dived, or 'sounded,' as the fishermen say; and before the unfortunate men could cut the rope, the boat was hauled below the surface, and the whole of the crew were drowned. This is one of the risks to which whalers are exposed, but it is strange the men were not prepared to meet it.

5.

It is a great mistake to suppose that the best work of the world is done by people of great opportunities and great strength. It is unquestionably an advantage to have both these things, but neither of them is a necessity to the man who has the spirit and the pluck to achieve great results. Some of the greatest work of our time has been done by men of physical feebleness.

6.

It is related that Queen Elizabeth was more sensitive on the subject of beauty than any distinguished person in history. She would admit into her household none save those of good stature and birth, and on one occasion went so far as to refuse a courtier for no other reason than that his jaw lacked one tooth.

7.

Not so very long ago, two poor foreigners who tried to earn an honest penny by exhibiting a performing bear threw the people of a Yorkshire village into a state of feverish excitement. Footsore and weary, the showmen had entered an inn to rest and refresh themselves. While they were taking their ease within, the bear without made a bold bid for freedom by shaking off its chain. It injured a labourer, worried several sheep, and then escaped into a wood. Oddly enough, the owners made no endeavour to catch it.

8.

One would have thought that the occupation of those men who work in the London sewers would be exceedingly unhealthy. But such is not the case, for, beyond their being rather subject to troubles of the eyes, there is no ground for believing that their work is injurious. The sewers are well ventilated, and those employed are mostly picked men, strong and healthy, but it is certain that many of the new hands have to give up on trial of the work.

9.

Bear-baiting was a popular pastime in days gone by, as the following anecdote will prove. Early in the seventeenth century, the people of a certain town discovered that the Bible in their church was tattered and torn, and the Corporation accordingly began to put by various sums of money to buy a new one. At this time the town bear fell ill and died. Here was a sad disaster. The bear-keeper begged the Corporation to help him. They did assist him, too, with a vengeance, for they granted him the money that had been laid by for the purchase of the Bible, deciding that the preacher must continue to use the old worn-out volume.

10.

How to tell the rate of travelling by railway can be accomplished by anyone, with very fair precision, in the following manner:—The telegraph posts along a railway line in this country are placed thirty to the mile. There are, we need hardly remind our readers, sixty minutes to the hour, so that if the number of posts passed in a minute are multiplied by two, the result gives the number of miles per hour at which the train is travelling.

STANDARDS V.—VII.

No. 278.

All men who know anything worth knowing, and all who can do anything worth doing, are substantially self-taught. They who excuse their own deficiencies on the ground that they had nobody to teach them, would probably have done no credit to a teacher. The best of instructors can but show us the right road. Our own feet must traverse it; with us alone it lies to say how far we will press onward or how soon falter by the way. What we call educational advantages are less often stepping-stones than pitfalls.

No. 279.

The Prince of Wales must find consolation in the thought that he is less unfortunate than another exalted personage, the Austrian monarch, since to him a second son is left, upon whom fatherly and

motherly love can be centred. But, with all that, a father and a mother standing at the death-bed of their young son cannot but feel stricken to the heart, and whoever has lost a child can enter into their anguish. The Duke of Clarence, moreover, is a loss to the nation, and since England has ceased to cherish insular notions, and has co-operated with Continental Powers for the maintenance of peace, those countries are enabled to take greater interest in what happens on British soil. (H.M.I.'s TEST.)

No. 280.

A conspicuous trait in the character of the Australian native is treachery, and the colonists are wont to give the stranger the warning, 'Never have a black behind you,' Nor should one, as a rule, rely on them. How difficult it is for them to lay aside their uncivilised habits may be seen from the following incident: A squatter was walking in the bush in company with his black boy, hunting bush turkey. As they sauntered forth, the black boy touched him on the shoulder from behind and said, 'Let me go ahead.' When the squatter asked why he wished to go before him, the boy answered, 'I feel such an inclination to kill you.' Yet this black boy had been on the station for several years, where he had served as shepherd and had proved himself very capable.

No. 281.

As there are persons who seem to walk through life with their eyes open, seeing nothing, so there are others who read through books, and perhaps even cram themselves with facts, without carrying away any living pictures of significant story which might arouse the fancy in an hour of leisure, or gird them with endurance in a moment of difficulty. Ask yourself, therefore, always, when you have read a chapter of any notable book, not what you saw printed on a grey page, but what you see pictured in the glowing gallery of your imagination. Have your fancy always vivid, and full of body and colour.

No. 282.

In mercantile affairs, punctuality is as important as in military. Many are the instances in which the neglect to renew an insurance punctually has led to serious loss. With sound policy do the banks insist, under the penalty of a protest, on the punctual payment of notes, for were they to do otherwise, commercial transactions would fall into inextricable confusion. Many and many a time has the failure of one man to meet his obligations brought on the ruin of a score of others, just as the toppling down in a line of bricks, of the master brick, causes the fall of all the rest. Thousands remain poor all their lives, who if they were more faithful to their word, would secure a large run of custom, and so make their fortunes. Be punctual if you would succeed.

No. 283.

In the case of Russia the wisdom, if not the inspiration, of Solomon has been justified with a swiftness that may well seem to the believers the evidence of the anger of the Lord. For it cannot be questioned that the famine that is now scourging European Russia, and that is more extended and more terrible than any known in the modern history of the civilised world, has been greatly aggravated, and may be said to be, in considerable measure, actually caused by the cruel treatment of the Jews. Over a very great portion of the grain-producing region of Russia, the Jews, and they alone, have furnished the money for seed, for the culture, for the gathering, and the moving of the crops. (H.M.I's. TEST.)

No. 284.

Artificial ivory is, according to an American paper, to be made in future out of milk. The milk is first coagulated as in the process of making cheese. This is then strained and the whey rejected. Ten pounds of the curd is taken and mixed with a solution of three pounds of borax in three quarts of water. This mixture is now placed in a suitable vessel over a slow fire, and left there till it separates into two parts, the one as thin as water, the other rather thicker, somewhat resembling melted gelatine. The watery part is next drawn off, and to the residue is added a solution of one pound of a mineral salt in three pints of water.

No. 285.

A sham fight among the Zulus is an impressive spectacle. The dusky warriors are fine muscular fellows, athletic and highly trained. The rank and file, untrammelled by ornaments and dress, move about with grace and freedom. The officers, chiefs, and head men wear coronets of ostrich feathers, which rustle freely with every movement of the body. Circling their brows are rolls of tiger skin from which descend fringes of coarse hair. From the neck and shoulders to the knees their bodies are covered with the tails of monkeys and tigers, and strips of various hides strung together in girdles; their waists are girt about with tufts of lions' mane and cow hair.

No. 286.

The going and coming of the years are suggestive. He must be heedless, indeed, who is not aroused thereby to quickened thought and reflection. The change is made silently and without a break, but to him who is alert and observant, it is like stepping from one plank to another as they float on the current of a mighty river. They follow each other in such close connection that just as the one upon which he has been running slips away and falls over the precipice into the irrevocable past, he steps upon the next and begins anew the race for life. Whether or not he will reach another, or be carried down to eternity with this one, as so many were with the last, he knows not. The first thought, then, suggested by the changing of years is the uncertainty of life.

No. 287.

The truest life—that most accordant with our nature—is one in which physical and mental labour are judiciously mingled, alternating with such recreation as tends to refresh and renovate both. Neither constant bodily toil nor incessant study is advisable. When the muscles are tired give them a rest, and do a little head-work. When both head and hands are weary, try amusement—light reading of a wholesome kind, a romp with your children, if you have any, a social evening with a neighbour—anything, in fact, that may properly be termed innocent relaxation.

No. 288.

The State census tells us how many people are able to read, but it does not say how many are able to read well. Good reading is a luxury—somewhat rare, but very attractive when it can be had. There are few ways of passing a winter evening more delightful than in listening to choice extracts from the best writers, read by one who not only appreciates the sentiment of the author, but is also able to render it impressively. There are some poems which cannot be appreciated without the aid of the living voice. The music of the rhythm does not reach the soul through the eye.

No. 289.

The same dislike for manual toil, though in less degree, has penetrated to the artisan class, and a doleful spectacle is presented in many homes of a grey-haired father or mother having to support grown-up sons and daughters, who should be maintaining their parents in their old days. Every development of luxury, every habit contracted of living only by pleasure, means a development of greater cunning in manipulating money markets, and instead of having capital steadily controlled, a fever spirit of gambling will manifest itself.

No. 290.

Green's 'Short History,' was twice re-written, and was only published at last owing to the urgent advice of his friends. This book, which appeared at the end of 1874, fused together the materials for English history, and presented them with a fulness and a unity which had never been attempted before. Its object was to lay hold of the great features of social development, and show the progress of popular life. What Macaulay had done for a period of English history, Green did for it as a whole. From a mass of scattered details he constructed a series of pictures which were full of life.

No. 291.

Purity of thought and deed has characterised the entire life of her Royal Highness the Princess of Wales, and to be in her set means to be received by a woman whom the whole world knows to be good and true. Women who find their lot cast in high places are bound to set an example to the rest of the world, but too often this example is made tiresome and uninteresting. With the Princess this has been different, for her own sweet manner, her own faith—when trouble came—that she would be helped, and her interest not only in her own life and that of those about her, but extending as it does to the stranger and the sufferer, has made many women eager to be as good as our Princess.

No. 292.

Life at Sandringham is very simple. The Prince breakfasts with his sons and any male members of the Royal Family who may be there; the Princess breakfasts in her private apartment, while the young Princesses break their fast in an old-fashioned room still known as the schoolroom. When this meal is over they come down to say good morning to their father, and are usually accompanied by a group of pet dogs. The gentlemen go out shooting or riding, while the ladies in the house amuse themselves with books and papers, and, later in the day, are joined by the Princess.

No. 293.

Up in the mountains of India, there is a spider which spins a web like bright yellowish silk, the central net of which is five feet in diameter, while the supporting lines, or guys, as they are called, measure some ten or twelve feet; and riding quickly in the early morning, one may dash right into it, the stout threads twining around your face like a veil, while, as the creature which has woven it takes up his position in the middle, he generally catches you right on the nose, and, though he seldom bites or stings, the contact of his large body and long legs is anything but pleasant.

No. 294.

A composition which is comparatively commonplace may be wonderfully transformed by the human voice. A great orator and statesman once came home from church, after hearing a preacher, who had such a musical instrument in his throat that he was able to charm everybody by his exquisite tone and accent, and remarked to a friend that he had just heard the greatest sermon to which he ever listened in his life. His friend borrowed the manuscript from the author, and asked permission to read the discourse in his own plain way to the statesman, and when he had finished, the latter said that could not be the same sermon he had heard. With the absence of the speaker's tone all the charm had vanished.

No. 295.

If you belong to the working world, and eat your bread in the sweat of your brow, do not fancy that you have, therefore, no opportunity to enrich your mind. Labour, thank heaven, is not so ill-paid in this country that the toiler cannot afford to throw down his tools now and then and cultivate his intellect. A great many of our most distinguished men have been farm labourers and handicraftsmen. Many of them were not even 'college bred.' Our common schools impart all the instruction necessary to enable their pupils, in after life, to educate themselves thoroughly in the higher branches of knowledge.

No. 296.

The habit of shirking is a great evil in our land. Sad and bitter are the experiences of multitudes who have lost positions of emolument and trust by shirking duties and responsibilities devolving upon them. They saw their mistake after it was too late. It is a bad sign to see a young man contracting the habit of shirking. You may set it down at once that sooner or later he will be a drone in the great hive of human industry, living without any purpose in life, and scorned by all who have willing hands and follow up whatever they can find to do. If you want to gain the confidence and esteem of your employer, never shrink from a duty. If overtasked, lay in your complaints, and you will always get a hearing. If you once begin to do so, you may set it down as a fixed fact that the habit will follow you through life, and instead of a 'success' you will be an utter failure.

No. 297.

Few of us make our lives as bright and happy as we might. We are still in a comparatively early stage of human development, and we have not yet realized to the full that subordination of ourselves which is requisite to the full sympathy with others, but we are beginning to grasp that selfish pursuits of our own aims and our own happiness is not the way to secure them. Books help us to look 'on other lives besides our own.' It is well for everyone to see what are the troubles of others, and how they are borne; to care about something in this vast world besides the gratification of small selfish desires; to care for what is best in thought and action; something that is good apart from the accident of your own lot.

No. 298.

It is a curious fact that more than sixty years ago the principle upon which the automatic machines are manipulated was applied to open tobacco-boxes. In some parts of England these square boxes survive in many an old-fashioned inn. By dropping a halfpenny into the slot, the box, by means of a spring similar to those now employed for other purposes, flew open, and for the halfpenny the operator was entitled to take a pipe of tobacco. In those good old-fashioned times people were supposed to be honest enough to take no more than a single pipe, and to close the box before passing it on to the next customer. The late King of Siam was a purchaser of a dozen of them, which are reported to have greatly diverted his Majesty, who presented them to some of his courtiers.

No. 299.

Someone has well remarked that the sharpest test of a man's character is in his treatment of what is in his power and wholly below him. Motives of self-interest are sufficiently strong and numerous to produce irreproachable conduct towards superiors or equals in strength or knowledge or station or wealth or intelligence. When, therefore, we so order our conduct as to conciliate and please those who can thus control our happiness and welfare, it may be a token of intelligence, but not necessarily of noble character. When, however, we come into relations with those who have no such power, who must accept without appeal what we choose to give them, who have no more substantial reward to bestow than gratitude or affection, and no severer penalty than secret and impotent wrath, we show something of our true selves by the way in which we treat them.

No. 300.

Warren Hastings was a man of great original capacity, whose special qualities, and their defects, had been exercised and drawn out by a course of very practical training. He owed nothing to the study of text-books. He had been shipped out to India a raw lad, and had there been left to gather his experience among the extraordinary incidents of Anglo-Indian politics in their earliest, roughest, and most rudimentary stage. He had to work with a set of adventurous and rather unscrupulous Englishmen in dealing with a subject population of a totally different nature; he found himself in a position of much hazard, where most things were permissible and very few things impossible, where written laws were unknown, where the common law and conventions of civilized states were as yet unrecognised, and where the primitive necessity of self-preservation, which lies at the basis of the most firmly-organized societies, stood constantly and markedly in the foreground.

SCHOOL BOARD EXAMINATIONS IN SCRIPTURE KNOWLEDGE.

At a time when the question of religious instruction in our Board Schools is being so warmly discussed, it may be interesting to many of our readers to have placed before them some particulars respecting the examinations in Scripture which are annually held under the London School Board.

Appended to the Board Code of Regulations is a detailed syllabus of the instruction required to be given in all schools under the Board. This includes, for each Standard, definite portions of the Scripture to be learnt by heart, and a course of instruction in appointed portions of the Old and New Testament narratives. The teachers are directed to make the lessons as practical as possible, so that they may have a real bearing on the life and conduct of the children in their homes, in the school, and in the playground and the streets.

On some appointed day in each year the teachers are instructed to examine the various Standards, with a view to the selection of the children who have most distinguished themselves in the acquirement of the knowledge imparted in the daily Scripture Lessons. A small percentage of names has to be sent in to the office, the proportion varying with the Standard. In the four lower Standards certificates are awarded to the children whose names are sent in, with prizes of nicely-bound copies of the New Testament to those who stand at the head of the lists for Standards II., III., and IV.

The selected children of the Standards above the fourth are subjected to a competitive written examination on another day two or three weeks later, and prizes of Bibles and Testaments are awarded to those who obtain the highest proportion of marks, and certificates to those next in merit.

The prizes are provided out of a fund contributed to by Sir Francis Peek and the Religious Tract Society. As the number of prizes is limited, and averages about one Bible and one Testament for each department under the School Board, the competition is very keen.

The range of knowledge required can perhaps be best judged from the questions set at the examinations. A perusal of these will also show how it is sought to make the instruction practical in its character. It may further prove how difficult the examiners occasionally find it to keep quite clear of matters which trench upon controversial points of doctrine, though, as a rule, little complaint can be made on this score. What is perhaps more often found is that the questions presuppose, on the part of the pupils, an amount of reasoning power, a grasp of principles, and a degree of insight into abstruse matters which school children rarely possess. In the questions which we give below, this is perhaps specially noticeable in the questions on the Book of Isaiah set for Standard VI.

QUESTIONS FOR SCHOLARS.

STANDARD V.

Section I.

(*Two questions only may be answered in this Section.*)

1. Give the lessons to be drawn from the 23rd Psalm.

2. Show the importance of Truthfulness from the Book of Proverbs.

3. Write out the Lord's Prayer, and explain—
'Our Father which art in heaven.'
'Hallowed be Thy name.'
'And forgive us our debts as we forgive our debtors.'

Section II.

(*Two questions only may be answered in this Section.*)

1. Write out the story of Naaman, and state what lessons you would learn from it.

2. What led to the breaking up of Solomon's kingdom into two divisions?

3. Describe the treatment of David by Saul, and of Saul by David. What lessons would you learn from each?

4. What were the great sins of Ahab? How was he warned by God, and how was he punished?

Section III.

(*Two questions only may be answered in this Section.*)

1. Who was St. Mark?

2. What account does St. Mark give of our Lord's Baptism and of His Temptation? What do you mean by Temptation?

3. Write out any parable from St. Mark's Gospel, and explain it in your own words.

4. Give an account of the Healing of the Sick of the Palsy.

5. Show from St. Mark's Gospel that Jesus loved children.

STANDARD VI.

[These questions are the same as set for Candidates.]

Section I.

(*One question only may be answered in this Section.*)

1. Write out Ephesians, chap. iv., verses 25 to 32. Show how this passage illustrates the 6th, 8th, and 9th Commandments respectively.

2. Write out St. James, chap. i., verses 17 to 27. What is meant by "the perfect law of liberty"?

Section II.

(*Two questions only may be answered in this Section.*)

1. In what particulars does the life of Jesus correspond with certain passages in the 53rd chapter of Isaiah?

2. What are the words in which Isaiah prophesies the call and conversion of the Gentiles?

3. How does Isaiah describe the nature of an acceptable fast?

4. Why has Isaiah been called the Evangelical prophet?

Section III.

(*Three questions only may be answered in this Section.*)

1. State what you know about Herod who was king when Jesus was born.

2. Give a short account of the teaching of John the Baptist.

3. What is meant by covetousness? What reference is there to it in the Sermon on the Mount?

4. What is prayer? Write down what you remember that our Lord said respecting it.

5. Mention the parables given by St. Matthew which teach (*a*) The forgiveness of injuries; (*b*) The necessity of perseverance in well-doing. And write shortly the substance of one of them.

6. On what occasions were the following expressions used:—
(*a*) 'A good tree cannot bring forth evil fruit;'
(*b*) 'He that is not with Me is against Me';
(*c*) 'Hosanna to the Son of David'?

STANDARD VII.

Section I.

(*One question only may be answered in this Section.*)

1. What does St. John say with regard to brotherly love? 1 John, chap. iii.

2. Write out the verses in which St. Paul exhorts to unity, and explain them. Eph., chap. iv.

Section II.

(*Two questions only may be answered in this Section.*)

1. Who were the kings with whom Jeremiah was brought into contact? Describe in a few words the character of each.

2. What was the chief sin for which Jeremiah upbraided the Jews? What advice did he give the Jews on this subject?

3. Give an account of the persecutions which Jeremiah encountered.

Section III.

(*Three questions only may be answered in this Section.*)

1. Give an account of our Lord's conversation with Nicodemus.

2. What did Jesus mean by saying He was the true vine, and His disciples the branches? By what other names did Jesus describe Himself as recorded by St. John?

3. In what connection with Jesus are the following persons mentioned—Philip, Lazarus and his sisters, and Caiaphas?

4. Write all the verses which you know from St. John's Gospel about loving one another.

5. Jesus said, 'If a man keep my saying, he shall never taste of death.' What did the Jews say to this, and what did Jesus answer?

6. What account is given in the Acts of the Apostles of the early Church in reference to its worship, its distribution of property, and its progress?

EX. STANDARD VII.

(*These questions are the same as set for First Year Pupil Teacher Probationers.*)

Section I.

(*Three questions only may be answered in this Section.*)

1. What lessons are to be learnt from the story of Cain and Abel?

2. What do we learn from the Book of Genesis of the people who lived in Canaan in the time of Abraham?

3. What places in the land of Canaan are connected with events in the lives of Abraham, Isaac, and Jacob?

4. Relate the story of Hagar and Ishmael. What lessons are to be learnt from it?

5. How are the tribes of Israel described in the dying blessing of Jacob?

Section II.

(*Three questions only may be answered in this Section.*)

1. What does St. Mark tell us of the teaching of John the Baptist?

2. What was the teaching of our Lord with reference to the Sabbath? What incidents are related as giving occasion for this teaching?

3. "Whosoever shall do the will of God, the same is my brother, and my sister, and my mother." On what occasion were these words spoken, and what may we learn from them?

4. What is our Lord's explanation of the Parable of the Sower?

5. How does our Lord rebuke the Pharisees with reference to their holding to their traditions?

6. Relate the incident of the rich young man coming to our Lord, and give Christ's teaching with regard to it.

It ought to be added that partly as an additional stimulus to the teachers and scholars, partly to direct public attention to and foster public interest in the religious portion of Board School education, the principal prizes are distributed periodically at some great gathering. Once in three years this takes place at the Crystal Palace, and many thousands of the children and their parents are drawn together to take part in the proceedings of the day. A concert in which the music is rendered by four or five thousand selected children forms a most striking and enjoyable part of the day's programme.

The prizes and certificates not given at the general distribution are given at local meetings held under the auspices of the Board in the districts of the various schools, and Members of the Board and other prominent friends of education, take the opportunities thus afforded to address the parents and such of the local public as can be induced to attend.

OUR PUPIL TEACHERS' COURSE.

I. ARITHMETIC.

i. (*a*) *How often will a wheel of given circumference turn round in a given distance?*

It is plain that one revolution of a wheel upon the ground will carry it forward the distance of its circumference. Thus, a wheel a yard in circumference will revolve twice in six feet, etc.

ii. STOCK. (*b*) *What income will £1,998 invested in the 3½ per cents. at 94½ yield annually?*

Junior pupil teachers too frequently work such problems in a round-about style, by first finding the number of shares (or amount of stock), and next the proceeds of that stock. However, only one step is necessary if the sum be rendered thus :—

If the income from 94½ be £3 10s., *what will the income from £1,998 be?* Ans. £74.

(*c*) *If my yearly income from investing £6,174 in 3½ per cents. is £220 10s., at what price did I buy?* Ans. 98.

In other words, *How much money will produce £3½ yearly income, if £6,174 produces £220 10s.?*

(*d*) *If my yearly income from investing £6,174 in stock at 98 is £220 10s., what was the nominal per cent. of the stock?* Ans. 3½.

Otherwise, *If £6,174 produce £220½, what will 98 produce?*

(*e*) *If the 3½ per cents. are at 98, how much must be invested to produce an annual income of £220½?*

More clearly thus : *If £98 invested produce £3½, how much must be invested to produce £220½?*

(*f*) *When the 4 per cents. are at 92 and the 5 per cents. at 105, which is the better investment?*

Ans. 5 per cents., for they yield $\frac{1}{21}$ of the principal annually, whilst the 4 per cents. only yield $\frac{1}{23}$.

(*g*) *If the 4 per cents. yield an investor 5 per cent., what is their price?* Ans. 80.

This is a problem in inverse proportion, for a little consideration will show that when the actual percentage exceeds the nominal, the stock is at a discount ; and *vice versâ*, when the nominal percentage exceeds the actual, the stock is at a premium. The statement is, 'As the actual percentage is to the nominal, so the nominal price per share to the actual' ; *or*, As 5 : 4 :: £100 : £80.

(*h*) The buying and selling of stocks is generally done through a broker, who charges what is called *brokerage* as remuneration. This commission is generally ¼ per cent. on £100 stock (*not on £100 cash*), and is to be added or subtracted from the price of the stock, according as the stock is bought or sold.

Thus, if A sells B £100 stock at 98⅛, A only *receives* £98 10s., whilst B *pays* £98 15s.

N.B. For fuller information on Stock, see Dixon and Beach's 'Girls' Arithmetic.'

iii. INVERSE PROPORTION. This often causes the tyro much trouble.

(*i*) See (*g*).

(*j*) When *time* is one of the elements in a proportion, an inverse statement should often be looked for.

If 100 men can eat a quantity of provisions in 8 days, how long will it take 80 men? [Ans. 10 days.] As 80 : 100 :: 8 : 10.

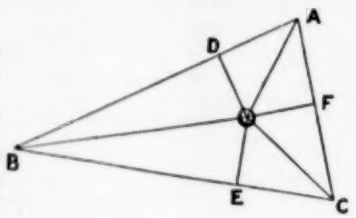
(*k*) *When wheat is 5s. per bushel, the 6d. loaf weighs 5 lbs., what will it weigh when wheat is 6s. per bushel?* [Ans. 4⅙ lbs.] As 6 : 5 :: 5 : 4⅙.

(*l*) *When 10 men carry a beam each lifts 3 cwt., if 15 men carry it, what weight will each lift?* [Ans. 2 cwt.] As 15 : 10 :: 3 : 2.

II. EUCLID.

i. The bisectors of the angles of a triangle are concurrent.

Let ABC be any triangle and BO and AO bisectors of angles ABC and BAC respectively.



Construction—

Join OC, and drop perpendiculars OD, OE, OF to AB, BC, and AC, respectively.

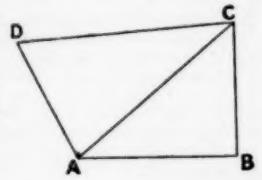
Hints—

Prove that OD = OE = OF (by I. 4).

,, that ∧FCO = ∧ECO (by I. 26 or I. 47), etc.

ii. Construct a square whose area shall be three times that of a given square.

Let AB be a side of the given square.



Construction—

Draw BC = AB at right angles to AB.

Join AC. Draw AD = AB at right angles to AC.

Then $\overline{CD}^2 = 3\ \overline{AB}^2$.

Proof—

Two applications of Euclid I. 47.

III. AREAS (*Elementary Mensuration*).

i. Length multiplied by Breadth = Area. L × B = A.

From this we get $\frac{A}{B} = L$ and $\frac{A}{L} = B$.

Our Girl Readers, who are innocent of Algebra, can understand this, for if

$L \times B = A$, then $L \times B \div B = A \div B$, then $L = \frac{A}{B}$

Also $L \times B = A$, then $L \times B \div L = A \div L$, then $B = \frac{A}{L}$.

ii. A yard is 60 ft. long by 40 ft. broad, how many tiles 3 ins. by 2 ins. will it take to pave it?

Area of yard = 60 ft. × 40 ft. = 2,400 sq. ft. = 345,600 sq. ins.

,, tile = 3 ins. × 2 ins. = 6 sq. ins.

∴ No. of tiles = 345,600 ÷ 6 = 57,600 Ans.

iii. A room is 18 ft. long by 14 ft. broad, how many yards of oil-cloth 1 ft. 9 ins. wide will it take to cover it?

Area of room = 18 ft. × 14 ft. = 252 sq. feet = 36,288 sq. ins.

Area of oil-cloth also = 36,288 sq. ins., and breadth of oil-cloth = 21 ins.

We have now A = 36,288 sq. ins., and B = 21 ins.

But $L = \frac{A}{B} = \frac{36,288 \text{ sq. ins.}}{21 \text{ ins.}} = 1,728 \text{ ins.} = 144 \text{ ft.} = 48 \text{ yds.}$

Note that ft. × ft. = sq. ft., and that sq. ft. ÷ ft. = ft.

Long Measure is also sometimes called *Lineal* Measure or *Running* Measure.

IV. MODEL ANSWERS TO APRIL EXAMINATION QUESTIONS.

N.B.—Don't forget to study (*a*) The Scotch Model Answers, p. 679, and the English, p. 701 of our last issue.

(*b*) HISTORY.

BOYS AND GIRLS.—FIRST YEAR.

(*Answer three Questions only. One hour allowed.*)

1. By whom was the Roman Conquest of Britain completed? State its extent, and the means adopted to secure it. Give dates.

Britain was finally subdued by the Romans during the governorship of *Julius Agricola* (A.D. 78–85). Although the greater part of the island was conquered, the Britons in Wales, Cumberland, and Cornwall, and the natives of the Scottish Highlands were never really subdued. Walls bounded the province on the north, one from the Clyde to the Forth, built by Agricola (A.D. 81), another by Hadrian (A.D. 121). Suetonius observed that the Druids must be exterminated before any conquest could be made, and therefore carried his plan out at Anglesea (A.D. 61). Invasions from the north were prevented by the afore-mentioned walls. Good roads were made, Roman civilization introduced, strong citadels were built, the Britons were not instructed in the art of war, but were taught to develop the resources of the country.

2. Show briefly how the Roman Conquest differed in its effects from the Saxon Conquest.

The *Romans* conquered Britain, and held it as a *province* and a military station.

The *Saxons* conquered Britain, and permanently settled in the country.

Under the Romans the change was from barbarism to civilization.

Under the Saxons, civilization to barbarism. (The country grew more civilized after the re-introduction of Christianity by S. Augustine, A.D. 597.)

Under the Romans (the conquerors being united), the land was soon at peace.

But with the Saxons being divided, they were at war with each other till Wessex finally succeeded (A.D. 827) under Egbert.

Under the Romans, Britain was ruled by a governor from Rome.

Under the Saxons, by the native Witanagemote and a *king*, thus paving the way for the future Parliament.

Foreign trade flourished under the Romans, but not under the Saxons.

3. Give a short account of Theodore, Hengist, Penda, assigning to each his date as nearly as you can.

Theodore (of Tarsus) (669) was Archbishop of Canterbury. He organized the English Church, and founded several bishoprics. He called Synods of the Church.

Hengist (449) was a *Jutish* chieftain, and came over with Horsa at the request of Vortigern to aid against the Picts and Scots. Vortigern gave them Thanet, but, not satisfied, they beat him at *Aylesford*, 455, and seized his kingdom.

Penda (King of Mercia) thought religion was a question on which he could challenge the supremacy of Northumbria, and defeated *Edwin* at *Heathfield*, 633. He re-established paganism by afterwards defeating *Oswald* at *Maserfield*, 642; but he himself was defeated at *Winwidfield*, 655, by *Oswy* of *Northumbria*.

4. Name the three great kingdoms into which England was in time divided, and sketch the rise of one of them.

Mercia, *Northumbria*, and *Wessex*, were the three great kingdoms in the early Saxon times; Wessex finally subduing all the others.

Wessex was first established by *Cerdic* (519), and included the country south of the River Thames between Sussex and West Wales (Devon and Cornwall). Northumbria was the first kingdom at the beginning of the 7th century, and then for a short time Wessex was the first leading kingdom, under *Ine* (688-725) [he issued a Code of Laws]; but Penda defeating Edwin, for a long period it (Wessex) was subservient to *Northumbria*, and then *Mercia*.

In 800 the exiled prince *Egbert* came to Wessex and was chosen *king*. He first subdued the Britons, and the neighbouring Saxon kingdoms at Ellandune (823). *Mercia* submitted in 827, and shortly afterwards *Northumbria* acknowledged his supremacy.

Egbert and his successors made England one nation, and Edward (Alfred's son) first took the title, '*King of England*,' 901.

5. What led to the Battle of Stamford Bridge? Give a short account of the battle.

Harold's brother, *Tostig*, had been deprived of the Earldom of Northumbria by Edward; and, therefore, when Harold refused to restore it, he joined Hardrada, King of Norway, hoping to recover his lost estates.

They landed in Yorkshire, saying they were come to wrest England from Harold.

Both armies drew up in order of battle near Stamford Bridge, (Sept. 25) 1066. Hardrada formed his men in a circle, in the middle of which he placed himself. Harold formed his men in a solid triangle. Then, taking a strong body-guard, he went and asked for Tostig. All attempts to obtain peace having failed, the battle began. Harold's horsemen failed to break through the circle of the Norsemen. Then the solid triangle advanced, and after severe fighting Hardrada fell beneath Harold's axe. Tostig was also slain, and the remaining vikings and their soldiers fled to their ships and put out to sea.

6. Explain *Earl*, *Ceorl*, *Thrall*, *Thane*, *Alderman*.

Earl (from the Danish *jarl*) is now a nobleman, third in rank. The Earls under Knut and Edward the Confessor were the highest noblemen, and ruled vast portions of England. Thus *Godwin* was Earl of Wessex.

Ceorls (or Churls) were freemen, who possessed their own homesteads, and were only subject to the assembly of their fellow freemen. This equality was not permanent, for the wealthier churls grew into a superior class called earls, who exercised jurisdiction over the others. The Ceorl could wear long hair and carry arms, and was thus distinguished from the serf.

Thralls (Theows or Serfs) were the property of their master, and were bartered like cattle. They were either descended from the conquered Celts, prisoners of war, or debtors who could not pay their debts.

Thanes (thegn) were people who owned at least five hides of land (600 acres). This they acquired through *noble* (thegn) birth, or successful trade. The merchant who made three voyages in his own ship was made a thane (Athelstan's law).

Alderman were higher than '*thanes*,' and were firstly chiefs of their tribes. From Egbert's time they acted as viceroys, and governed shires in the king's name. In the 11th century the Danish title Earl supplanted Alderman, which latter title is now used to distinguish members of Town and County Councils, not elected by popular suffrage, but by the councillors themselves.

SECOND YEAR.—BOYS AND GIRLS.

(*Answer three of these Questions.*)

1. William I. may be described as a wise and great sovereign, but a cruel one. Give facts to illustrate the truth of the statement.

William I. showed his wisdom and greatness chiefly in the grants of land, for a great man's estate was dispersed over the country; he thus strengthened the central form of government. He was politic enough to desire a formal election; he built castles in the country and garrisoned them with Norman soldiers. He treated his subjects with *apparent* lenity.

His cruelty is shown by the Forest Laws; by laying the country waste from the Humber to the Tees (1070); by destroying villages and churches in *Hampshire* to make the *New Forest*.

2. What was the extent of Henry the Second's possessions when he became king?

Henry II. at his accession was King of England. He inherited *Normandy* and *Maine* from his mother, and *Anjou* and *Touraine* from his father.

(He afterwards acquired *Poitou* and *Aquitaine* by marriage, and the Overlordship of Ireland, 1172.)

3. What meaning and association have these words:—*Customs*, *Scutage*, *Interdict*, *King's Bench*, *Common Pleas*?

Customs are duties levied on imports and exports. From Henry VI.'s time to the time of Charles I. the customs had been granted to the king for life, but they were only granted to Charles for one year.

Scutage was a tax paid as a relief from Feudal Service, which Henry II. consented to receive, thus gaining a new source of revenue by which he could secure mercenary forces to act against the barons. It was abolished under Charles II., 1660.

An *Interdict* is a solemn prohibition of all religious ceremonies; e.g., churches are closed, dead are buried without prayers, &c. When John defied the Pope the latter placed England under an Interdict, 1208.

King's Bench and *Common Pleas* were two of the four courts which the Norman Court '*Curia Regis*' was afterwards divided into. They are now incorporated into the *Queen's Bench* Division, in which the Lord Chief Justice and 11 other judges sit to try both civil and criminal cases.

4. What sovereigns during the period you have studied were under the influence of favourites? Briefly name the favourite in each case.

Henry III. was under the influence of foreign favourites, and in 1232 Hubert de Burgh was ousted from office to make way for Peter des Roches, a Poitevin, who used his position to fill every position in Church and State with foreign adventurers. He was dismissed 1234. Henry was deposed 1264, but reinstated.

Edward II.'s favourites were Piers Gaveston, a Frenchman—who had been banished twice, was recalled and beheaded, 1312—and the two De Spensers, who were hanged in 1326.

Edward was deposed, 1327.

Richard II.'s favourites were De La Pole (Earl of Suffolk) and De Vere (Duke of Ireland). The barons demanded their dismissal, and fought at Radcot Bridge. De La Pole and De Vere were condemned to death by the Wonderful Parliament, 1388. Richard was deposed, 1399.

5. Give an account of Jack Cade's rebellion.

Richard, Duke of York, wished to be recognised as Henry VI.'s heir. Somerset and Suffolk opposed him, when an heir was born to Henry. Suffolk was murdered at sea, on his way to exile, and at this time, 1450, Jack Cade, an Irishman, pre-

tending to be Mortimer, and cousin of the Duke of York, marched at the head of 10,000 men on London. The *grievances* were—

(1.) The people were plundered and royal revenues wasted.

(2.) Nobles interfered in elections.

(3.) Justice was delayed in law courts.

The *demands* were that—

(1.) These grievances be redressed.

(2.) The Duke of York admitted to the Council.

Cade defeated a Royalist force at Sevenoaks, and again went to London and occupied it two days, but the Londoners rose, because the rebels plundered the city, and defeated them. Cade and his chief followers were executed.

6. Name some of the great statutes of Edward I., and briefly state their object.

1275. First Statute of *Westminster* provided for—(1.) Freedom of elections. (2.) Limitation of the amount of feudal aids.

1279. Statute of *Mortmain* forbade the alienation of land to religious bodies.

1283. Statute of *Merchants* enabled traders to imprison debtors and distrain their goods.

1285. Second Statute of *Westminster* created the practice of *entails* by which an estate could not be alienated by a subsequent possessor.

1290. Third Statute of *Westminster* stopped the practice of sub-infeudation.

1297. The *Confirmatio Cartarum* conferred on the Parliament of Three Estates the control of all taxes.

BOYS AND GIRLS.—THIRD YEAR.

(*Answer three Questions only.*)

1. Henry VII. initiated the home and foreign policy of the Tudors. Can you explain this and illustrate it by examples?

The home policy of the Tudors was to be almost despotic, to have a strong centralized government. The reasons this state of things was allowed are: This strong government was required (*a*) to keep turbulent nobles in order, (*b*) to have a respite from civil war, (*c*) it was borne by the people as a necessary consequence of the circumstances of the time. Thus we find the Star Chamber and High Commission had unbounded authority, the Royal Council controlled every department of the state, all the courts and the parliaments were wholly subservient to the sovereign. Forced loans, monopolies, and benevolences were raised.

Their foreign (Mary excepted) policy was to defy and expel the papal power and secure the nation from the attacks of foreign Catholic powers, and (*b*) as England was not seriously dangerous as an enemy, she was still useful as an ally, and so held the balance between the great powers.

(*a*) (*e.g.*) Henry VII. was independent of the Pope.

Henry VIII. threw off Papal authority.

Edward VI. was also independent of the Pope and so was Elizabeth. She helped the French Huguenots, and defeated the *Spanish Armada*.

(*b*) Henry VII. helped to reduce the French king's power, and Henry VIII. was continually changing from one side to another in the Continental wars.

2. What was Henry VIII.'s ostensible reason for desiring a divorce from Katharine? Name any very prominent characters in the divorce proceedings.

Henry had no heirs; he had fallen in love with Anne Boleyn, and promised her the crown; therefore he determined to divorce Catherine.

Wolsey was one of the most prominent characters in the divorce case, as he and *Campeggio* were the legates appointed to hear it. *Wolsey* was dismissed from office for not carrying out the king's wishes, and he died in 1530. Others, beside the parties concerned in the case, were Cranmer, who declared the marriage null and void, and Cromwell. The *clergy* also ratified Cranmer's decision.

3. What revolts took place in Edward VI.'s reign? What brought them about?

The insurrections in Edward VI.'s reign were chiefly brought about by the low state of the labour markets, and by the late religious innovations. The former was partly the result of the increasing practice of turning arable into pasture land, many men *being thereby* thrown out of work. The first outbreaks were in Devon and Cornwall, and were easily suppressed. The one in Norfolk under Ket, a tanner, was more formidable; he was defeated by the Earl of Warwick, and hanged at Norwich Castle, 1549.

4. What led to the passing of the Poor Law Act of Elizabeth? State its main provisions.

After the defeat of the Spanish Armada trade revived in England, and the Poor Law Act was passed (1601) to compel able-bodied men to work under pain of punishment, and to afford relief to destitute sufferers. The main provisions were: (1) The impotent poor were relieved; (2) The willing pauper was set to work, and the incorrigible vagrant whipped and imprisoned; (3) a poor rate was levied by regular assessors, and administered by properly appointed guardians or overseers.

The abolition in the reign of Henry VIII. of monasteries, whereat the poor were customarily relieved, rendered some such measure absolutely necessary.

5. When did the Commons revive the right of impeachment? Name in order the chief occasions on which this right was exercised during the period you have studied.

The right of Impeachment was revived under the Stuarts, when Lord Cobham impeached *Raleigh* for being implicated with the Bye and Main Plots, 1603. *Francis Bacon* was impeached 1621 for corruption, *Cranfield*, lord treasurer, impeached 1624. *Buckingham* impeached 1626. *Strafford* impeached of high treason 1641. *Clarendon* impeached 1667. *Danby* impeached 1678.

6. Give an account of the foreign relations of England under Cromwell.

Cromwell's foreign policy was vigorous and decided, and caused the name of England to be respected and feared abroad. Mazarin, the great French Minister, sought his friendship. He humbled the power of Spain. Jamaica was taken (1655) by Penn and Venables. Blake gained a victory at Santa Cruz (1657), and, in conjunction with Mazarin, Cromwell's Ironsides fought the Spaniards in the Netherlands. Cromwell received Dunkirk (1658) for this service. The Waldenses of the Alps had Cromwell's protection; pirates were swept from the Mediterranean; and Blake's cannon compelled Algiers, Tunis, and Leghorn to give reparation for injuries to British commerce.

V. A foot-note to Schedule V. of the New Code ordains that '*After the present year marks will not be given at any examination for a pass at any examination held more than a year previously.*'

To this astounding alteration there are many objections:—

(*a*) It harmfully legislates retrospectively in the case of those Pupil Teachers who, intending to sit at the 1894 or 1895 Scholarship Examination, have already wisely secured a Science:—

(*b*) It promotes over-pressure, as it will crowd the Scholarship, Drawing and Science examinations within a period of two months.

(*c*) It fosters cram, and prevents leisurely study and digestion of knowledge.

(*d*) It induces indolence during the early years of apprenticeship.

However, strenuous exertions have been put forth to induce the Department to remove this insapient restriction, and probably in next year's code its place will know it no more.

VI. Beginning at any month, Pupil Teachers may have the answers to our Monthly Questions marked, and solutions of Questions supplied, for the nominal charge of Half-a-Guinea per annum.

For this purpose we have engaged Honour Graduates of Oxford, London, Dublin, and the Royal Irish University, besides a full staff of distinguished Certificated Teachers.

Address—

Dr. G. BEACH, M.A.,
Examination Editor of 'Practical Teacher,'
Stanley Mount,
Macclesfield.

FIRST YEAR.

1. (*a*) Find the largest number that will divide both 123 and 147 without a remainder. Find also the smallest number which can be exactly divided by each of the above numbers. Ans. 3; 6,027.

(*b*) Show whether 353 is a prime number or not. Ans. Prime.

2. (*a*) The hind and front wheels of a carriage are 8 and 12 feet in circumference respectively. What is the least distance over which a carriage must travel so that each wheel may have made a complete number of revolutions? Ans. 24ft.

(*b*) What must be given for 759 tons at £1 13s. 10d. per ton. [Work this sum by two different methods.] Ans. £1,283 19s. 6d.

PUPIL TEACHERS' ROUTINE FOR JULY 1893.

DAYS	YEARS	FIRST WEEK			SECOND WEEK			THIRD WEEK			FOURTH WEEK		
		First Lesson	Second Lesson	Third Lesson	First Lesson	Second Lesson	Third Lesson	First Lesson	Second Lesson	Third Lesson	First Lesson	Second Lesson	Third Lesson
Monday	1	Analysis and Parsing *or* Latin (See Article)	How to teach Writing	Physical Geog. of Rivers	Analysis and Parsing *or* Latin (See Article)	Vulgar Fractions of Wts. & Measrs. Bracketed Vulg. Fractions	Dates from 901 to 975 A.D.	Analysis and Parsing *or* Latin (See Article)	How to teach Arithmetic	Reduc. of Vulgs. to Decimals. Comp. Practice	Composition or Paraphrasing *or* Latin (See Article)	How to teach Spelling	Red. of Decimals to Vulgars. Simple Proportn.
	2			Latitude		Percentages. Simple Practice	Dates from 1327 to 1360 A.D.		How to teach Mental Arithmetic	Percentages. Compound Practice			Misc. Problems
	3		How to teach Form	Winds		Compound Practice. Simple Proportion	Dynastic Tables		How to teach Colour	Stocks. Fractions of Money		How to teach Number	Square Root Fractions of Measures
Tuesday	1	Euclid I. 5. Paper Patterns of Garments	Map of Irish Sea	Scripture *or* Revision	Euclid I. 6. Knitting Sock	Lives of Great Historic Personages	Scripture *or* Revision	Euclid I. 7. Stocking-hole mending	Physical Geography of Rivers	Scripture *or* Revision	Euclid I. 8. Paper Patterns of Garments	Subtr. of Algebra. Stocking-hole mending	Scripture *or* Revision
	2	Euclid I. 7, 8. Paper Patterns of Garments	Map of Italy		Euclid I. 9, 10, 11. Knitting Stocking			Euclid I. 12, 13. Calico Patch	Longitude		Euclid I. 14, 15. Paper Patterns of Garments	G.C.M. of Algebra. Flannel Patch	
	3	Euclid I. 37, 38, 39. Paper Patterns of Garments	Map of South Africa		Euclid I. 40, 41. Any Needlework			Euclid I. 42, 43. Hedge-tear Dam	Ocean Currents		Euclid I. 44, 45. Paper Patterns of Garments	Simple Equations. Hedge-tear Dam	
Wednesday	1	History from 1012 to 1042 A.D.	Prefixes, Roots, or Affixes, *or* Latin	Reading Aloud (Poetry)	History from 1042 to 1066 A.D.	Any Geography	Literature, Repetition, and Writing	History of the 'Heptarchy'	Prefixes, Roots, or Affixes, *or* Latin	Reading Aloud (Prose)	Dates from 795 to 1035 A.D.	Circulating Decimals. Bills of Parcels	Map of Ireland
	2	History from 1327 to 1376 A.D.			History from 1370 to 1399 A.D.	Latitude		History from 1410 to 1422 A.D.			Dates from 1399 to 1422 A.D.	Stocks. Vulgar Fractions of Weights	Map of Spanish Peninsula
	3	History from 1649 to 1660 A.D.			History from 1660 to 1678 A.D.	Ocean Currents		Battles of the Great Rebellion			Constitutional Struggle of the Stuart Period	Stocks. Simple Proportion	Map of Mediterranean Sea
Thursday	1	Geography of Scotland	Multip. of Algebra. Paper Patterns of Garments	English from Text Book *or* Latin	Geography of Australia	History of Roman Period	Multiplication of Algebra. Knitting Sock.	Geography of Australia	Metric System	Literature, Repetition, and Writing	Geography of Ireland	History from Egbert to Canute	Composition or Paraphrasing *or* Latin
	2	Geography of Europe	Division of Algebra Paper Patterns of Garments		Geography of India	History from 1399 to 1410 A.D.	Div. of Algebra. Knitting Stocking	Climates of British Empire			Productions of British Empire	History from 1422 to 1461 A.D.	
	3	Geography of Africa	Algebraic Fractns. Paper Patterns of Garments		Geography of Asia	History from 1678 to 1685 A.D.	Square Root of Algebra. Any Needlework	Geography of Asia			Geography of Asia	History from 1685 to 1688 A.D.	
Friday	1	Vulgar Frac. of Money, Measures, and Multiples	Examination		Vulgar Fractions of Measures. Any Add. or Sub. of Vulgar Fractns.	Examination		Multip. of Decimals Easy Multip. of Vulgar Fractions	Examination		Circulating Decls. Household Accounts	Examination	
	2	Proofs of Required Rules			Miscellaneous Problems			Stocks. Mixed Vulgars and Decimals			Stocks. Vulgar Fractions of Money		
	3	Miscel. Problems, Simple Proportion			Prst. Worth, Disct. Mixed Vulgars and Decimals			Stocks. Fractions of Weights			Stocks. Simple Proportion		
Saturday	1	French *or* Latin	Physical Geography	Freehand, Perspective, *or* Geometry	French *or* Latin	Science	Freehand, Perspective, *or* Geometry	French *or* Latin	Physical Geography	Freehand, Perspective, *or* Geometry	French *or* Latin	Science	Freehand, Perspective, *or* Geometry
	2									Vocal Music			
	3			Theory of Music			Mensuration						Mensuration

3. Prove that $\frac{2}{3}$ of one unit is equal to $\frac{1}{3}$ of three units.

4. Write in *Largehand* the words Alphabet, Myopia, Nyanza, Why, Victoria.

„ *Smallhand* „ 'Twilight and Evening Star
And after that the dark.'

5. Point out the several sentences in the following extract, and the principal parts of each. Parse the words in italics.

'*Dear is* my little native *vale*,
The ring-dove builds and *murmurs there;*
Close to my cot she *tells her* tale
To every *passing* villager.
The squirrel leaps from tree to tree
And shells his nuts at *liberty*.

6. Take the following words to pieces, and tell the meaning of each of their parts:—Heavenward, Wooden, Blackish, Homeless, Faithful, Chicken, Kingdom, Forget, Manhood, Lambkin, Songster.

7. Write a short account of the Roman roads in England.

8. Draw a map of England, marking in the manufacturing towns.

9. What are the chief commercial rivers of Scotland and Ireland? Shew that they are well adapted for commerce. Name the towns thereon, and the nature of the cargoes passing out therefrom.

10. Give dates of Invasions of Cæsar, Invasion of Jutes, First Invasion of Danes, Invasion of Norwegians, and Invasion of Normans.

11. Explain *Ætheling*, *Sheriff*, *Tything*, *Wite-gild*, *Ordeal*, and *Compurgation*.

12. Write out Notes of a Lesson on the 'Capital Letters' to Standard I.

13. Write out any well-known melody.

14. Give a few rules for determining the Gender of Latin or French Nouns.

15. Write out the future indicative and imperfect subjunctive of *rego* or *recevoir*.

SECOND YEAR.

1. (*a*) Why is the charge per cent. for life insurance different for men of different ages, and why different also frequently for men engaged in different occupations?

(*b*) By selling 48 yards at 1s. 8d. per yard, a draper gains 4s. What was the cost price per yard, and what was his gain per cent.?
Ans. $5\frac{5}{19}$ per cent.

2. (*a*) In actual trade the percentage of gain is usually calculated on the selling price. What would be the p.c. gained, if so calculated, on the above question. Ans. 5 p.c.

(*b*) A gains 10 p.c. when selling an article to B, and B sells it to C, gaining 15 per cent. For how much p.c. more than cost of production was it sold? Ans. $27\frac{1}{2}$ p.c.

3. Find the G.C.M. of 27781 and 23507, and show that no other number can be their G.C.M. Ans. 2137.

4. As in first year.

5. Analyse the following passage, pointing out how each sentence is related to others, and what are the principal constituent parts of each. Parse also the words in italics:—

'*If* a man *be* gracious and *courteous* to strangers, *it* shows *that* he is a *citizen* of the world, and that *his* heart is *no* island *cut* off from other lands, *but* a *continent* that joins to them. If he be compassionate *towards* the affliction of *others*, it shows that his heart is *like* the noble *tree*, that is wounded *itself when* it gives the balm.'

6. Give a list of the more important Prefixes, both English and Latin, and illustrate your answer by examples.

7. Write lives of Anselm, Lanfranc, and Becket.

8. Draw a map of the Iberian Peninsula.

9. The captain of a ship makes it noon by the sextant, when by the ship's chronometer it is 3.30 p.m. In what longitude is the ship? Show that degrees of longitude in different latitudes are of unequal length.

10. Give dates of Tenchebrai, Northallerton, Gisors, Lincoln, Bannockburn, and Sluys.

11. Name some of the great statutes of Edward I., and briefly state their object.

12. Write out Euclid I. 5.

If any point in the circumference of a circle be taken and thence lines be drawn to the extremity of any diameter, they shall contain a right angle.

Give recipes for removing stains from damask, black-cloth, mahogany, and knives.

13. How would you correct a Dictation Lesson?

14. Write in the Treble clef the signatures of the following major keys:—

E, E♭, A♭, D♭, B♭.

Write out one measure of all the various forms of nine-pulse measure.

15. Give the present subjunctive of *moneo* and *regor* OR the affirmative, negative, and interrogative forms of *rompre*.

16. Write down the principal parts of *audio*, *condo*, *libero*, *solvo*, and *linquo*, OR the principal irregularities of *aller*, *boire*, *naître*, *pouvoir*, *savoir*.

THIRD YEAR.

1. (*a*) Explain the terms *brokerage*, *consols are at par*, *consols are at discount*.

(*b*) If I sell out £3,000 three-and-a-half per cents. at £112, and re-invest in a $4\frac{1}{4}$ per cent. stock at 119, how much do I gain in annual income? Answer £15.

2. Reduce 404 acres 1 rood 23 poles to the fraction of 413 acres 1 rood 37 poles. Ans. $\frac{89}{91}$.

3. If 357, each weighing 19 lbs., can be bought for £399, how many, each weighing 17 lbs., can be bought for £210?
Ans. 210.

4. As in First Year.

5. Analyse the following passage and parse the words in italics.

'*Forth from* his priestly prison Cranmer came,
Bowed down by age, erect with faith *renewed;*
And *ceaseless* dogged his steps the Spanish friars,
Urging with foul rebuke or *fouler* guile.
But Cranmer (*like* the pilot at the helm
Guides the frail bark *beset* by shoals and rocks
With steadfast eye *fixed* on the lighthouse star)
Serenely moved, as Stephen, to *his* death.'

6. In the subjoined sentences select any words which you know from their form to be of Latin origin, and give their exact meaning:—'As a drama it is deficient. The action is not probable. A masque, in those parts where supernatural intervention is admitted, must indeed be given up to all the freaks of imagination, but so far as the action is merely human it ought to be reasonable; which can hardly be said of the conduct of the two brothers.'—*Johnson*.

7. Write a short essay upon 'The Limits of Freedom.'

8. Draw a map of the Mediterranean Sea.

9. Which are the two most regular systems of winds on the globe? Where do we meet with irregular systems and with periodical winds? Say what you know about the last named.

10. Give dates of The Holy League, Battle of Pinkie, Capture of Calais, Massacre of St. Bartholomew, Hampton Court Conference, and Battle of Naseby.

11. Give an account of Cromwell's foreign policy and transactions?

12. Define *circle*, *parallelogram*. Write out Euclid I. 27. Describe the cleaning of a bedroom.

13. How would you teach Standard IV. to distinguish between Adverbs and Prepositions, and between Prepositions and Conjunctions?

14. If $x=1$, $y=-2$, $z=3$, $w=-4$; find the value of

$$\frac{x^2y^2+y^2z+w(x-y)}{10x-(z+y)^2}$$ Ans. $\frac{4}{9}$

15. The sides of a triangular field are respectively 11, 13, 20 chains. Find the acreage of the field, and the perpendicular distance of the largest side from the opposite corner.
Ans. 6·6 acres; 6·6 chains.

16. Write out the Minor Ascending Scale in three forms.

17. Give the compounds of *sum*, OR name the verbs conjugated like *recevoir*.

18. Give the principal parts of the verbs *volo*, *horter*, *premo*, *abdo* OR decline *lequel* and *ce*.

For Correspondence see foot of Certificate Article.

TEACHERS' DRAWING LESSONS.

SOLID GEOMETRY OR PROJECTION.

STANDARD VI.

BY E. BUFFERY RIDGE,
Art Master under the London School Board.

VIII.—*Square prism.*—This solid has square ends. Two of its three measurements are alike. It may be shorter, instead of longer, than its width and thickness; but, in the former case, it is commonly called a square slab.

The problems are all from Government Examination papers. The directions given in VI. and VII. apply equally well to this figure.

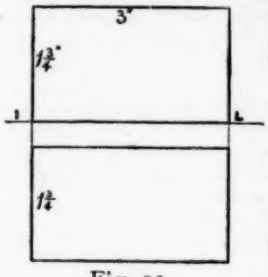


Fig. 31.

Problem 19. — Draw a square prism 3″ long, end 1¾″, when the long edges are parallel to both planes.

Lines parallel to both planes are parallel to the ground line. The elevation is 1¾″ high; the plan is 1¾″ wide.

Problem 20.—Plan of right prism 2″ high. Give elevation and section.

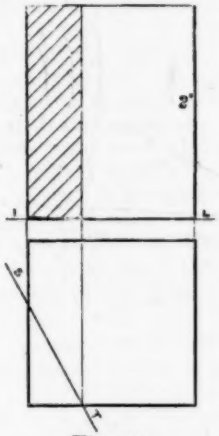


Fig. 32.

Measure 2″ up from IL for the elevation.

Problem 21.—Plan of square prism. Draw elevation and section.

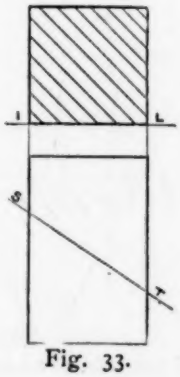


Fig. 33.

No dimensions are given in the question, because the plan shows length and width, and the thickness is equal to the width: therefore, make the elevation as high as the plan is wide. The section cuts all across.

Problem 22.—Plan of right prism. The ends are squares. Draw elevation. Complete as Fig. 31.

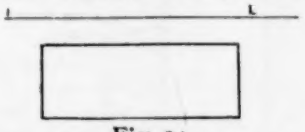


Fig. 34.

Problem 23.—Elevation of prism with square ends. Draw plan and section.

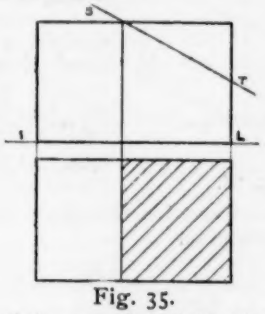


Fig. 35.

Width of plan equals height of elevation.

Problem 24.—Elevation of prism. Its ends are squares. Draw plan and section.

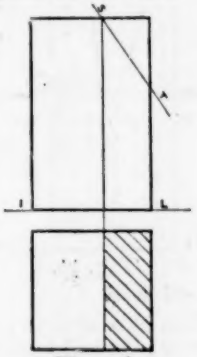


Fig. 36.

The plan is a square.

Problem 25.—Plan of right prism. The ends AB and CD are squares. Draw elevation and section.

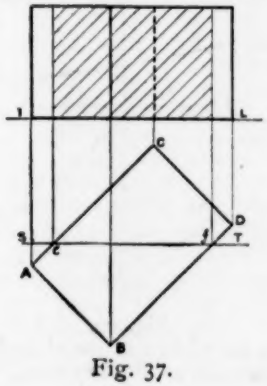


Fig. 37.

Height of elevation = AB; C, nearest the ground line, is a dotted line in elevation. Section from *e* to *f*.

Problem 26.—Plan of right prism. The bases CD, EF, are squares. Draw elevation and section, supposing the portion in front of AB to be cut away.

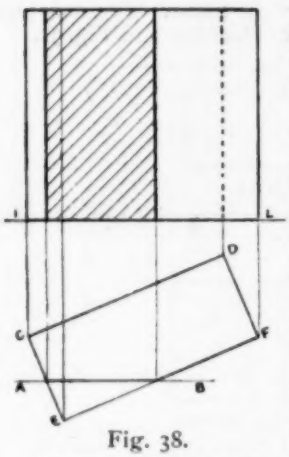


Fig. 38.

Notice particularly that CD and EF are the squares, not the short sides CE and DF, so that the figure must be as high as the length of CD. It is a square slab, standing on one narrow side. The upright edge projected from E would be removed, and it should therefore be left thin, or rubbed out, in the elevation, and the sides of the cut surface thickened.

Problem 27.—Elevation of right prism. Ends are squares. Draw plan.

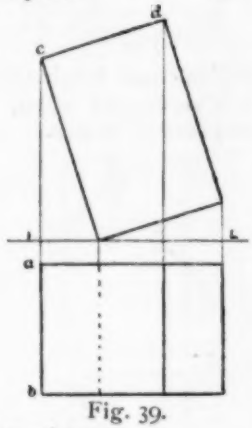


Fig. 39.

Measure *ab* equal to *cd*.

Problem 28.—Elevation of right prism. The bases are squares. Draw plan and section.

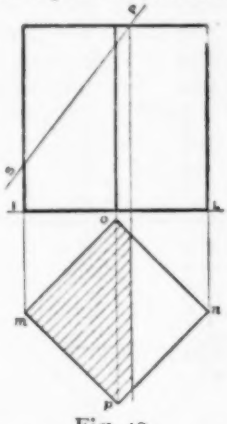


Fig. 40.

The line up the middle of the elevation shows that two faces of the solid are equally seen. It must therefore follow that the line on the top of the elevation is not the side of the square end, but its diagonal. (See Fig. 25.) Draw projectors down, and make $op = mn$.

Problem 29.—Plan of right prism. One diagonal in each square base is parallel to the horizontal plane. Draw elevation and section.

Each end of the plan is a square similar to that in Fig. 26. Make the upright diagonals in elevation equal to the horizontal diagonals in plan. The corner O, at the back of the solid, will be out of sight from the front, and the three lines running to it, $o'p'$, $o'q'$, and $o'r'$, will be dotted. Part of $o'r'$ is, however, hidden by the front edge of the solid. A model of this figure should be cut to show the section. It should be particularly noted that the shape of the sectional surface does not coincide with the elevation. ST, the section line, cuts the plan at three points—*x*, *y*, and *z*. *x* is in the *end* of the plan. A projector from *x* cuts the elevation of the end at $x'x'$. *y* is in the centre line, which is the plan of the *top and bottom long edges*. A projector cuts their elevations at $y'y'$. *z* is in the plan of the front edge, and a projector cuts its elevation at z'. These points, $x'x'$, $y'y'$, z', when joined, show the shape of the section in elevation.

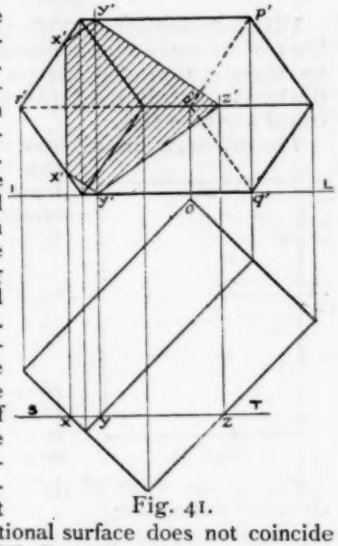


Fig. 41.

This is the most difficult problem set to Standard VI. It should be worked several times, changing the shape and position of the plan, and then upside down, the plan being then an elevation with horizontal section.

Problem 30.—Plan of two steps. C is the upper surface of the top step. The height of each step is equal to its width. Draw the elevation with section along AB.

The work of the elevation will be easily learnt from the figure.

The section cuts from the top of the upper step to the ground along *d e*, but the lower step only from *e* to *f*. Compare with the last problem. In Fig. 41 the boundary lines of the section are on slanting surfaces, which are seen at an angle, giving slant-

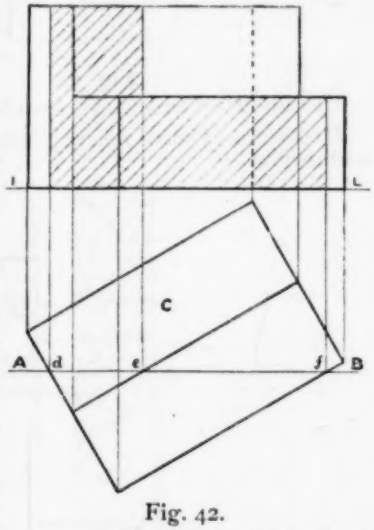


Fig. 42.

ing lines to the section except $x'x'$, which is on a vertical surface. In Fig. 42 the surfaces are either vertical or horizontal, and the section is shown by vertical and horizontal lines.

IX. *The Cube.* — Children's toy blocks will supply plenty of small models, which should be constantly used by the scholars placing them in every position on the front page of the drawing books.

The cube has three measurements, all of which are equal. It may be regarded as a square prism whose length is equal to its breadth and thickness.

The following are Examination problems :—

Problems 31, 32, *and* 33.—Given plans of cube, draw elevations and sections.

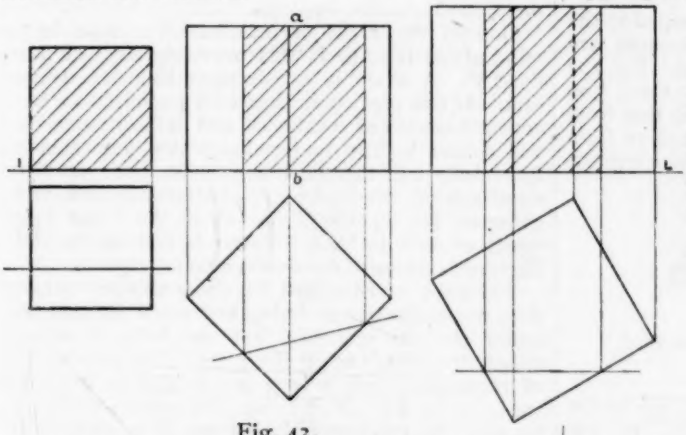


Fig. 43.

In each case the side of the square plan gives the height of the elevation.

Notice that in Problem 32 the line marked *ab* is the elevation of the upright edge at the back of the model as well as of the front edge, so that if the part cut off by the section were removed, the line *ab* would be dotted, showing that the back edge was no longer covered by the front edge.

Problems 34, 35, and 36. — Elevations of cube. Draw plans and sections. Width of plan = side of square in elevation.

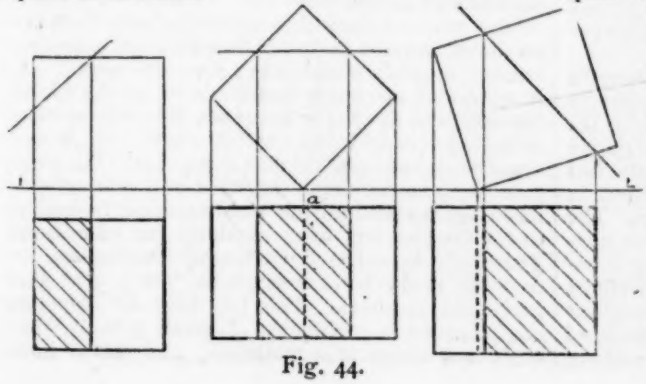


Fig. 44.

In Problem 35 the removal of the portion cut off by the section leaves *ab* in the plan as a dotted line.

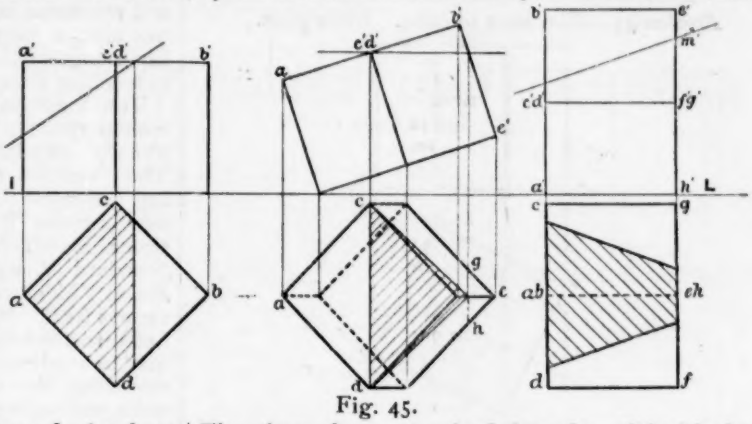


Fig. 45.

The plans of 34, 35, and 36 show the solid with the upper part removed.

Problems 37, 38, and 39. — Elevations of cubes. Draw plans and sections.

In each case make *cd*, the plan of a diagonal parallel to the horizontal plane, equal to $d'b'$, the elevation of a diagonal parallel to the vertical plane. In the sections care must be taken to notice *which* lines are cut. For instance, in Problem 38 the line $b'e'$ is cut in elevation, so that in plan the section runs to a point in *be*, and *not* to *g* or *h*.

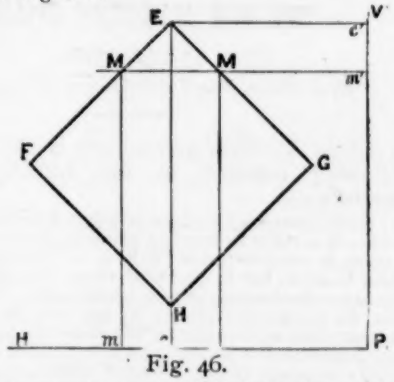


Fig. 46.

Problem 39 presents a new difficulty in the section. A perpendicular from m' runs along the end of the plan without determining any point by cutting a line. The line $e'f'g'k'$ is the elevation of a square seen edgeways, with one diagonal vertical and one horizontal. Seen sideways it would be like Fig. 45, with VP the vertical plane, and HP the horizontal plane. (Try it with the front page of Drawing Book.) MM is where the section plane cuts through the square end EFGH. Now because EM is inclined equally (45°) to the two planes, the elevation $e'm'$, and the plan *em* will be equal. In Fig. 45 mark the distance $e'm'$ on each side of *e*, and $n'b'$ on each side of *b*, and join across by straight lines. The top being removed, *ah* is shown as a dotted line.

Problems 40, 41, and 42.—Given plans of

cubes similar to the elevations in Problems 37, 38, and 39, to draw elevations and sections.

Problem 43.—Elevation of cube. Draw plan.

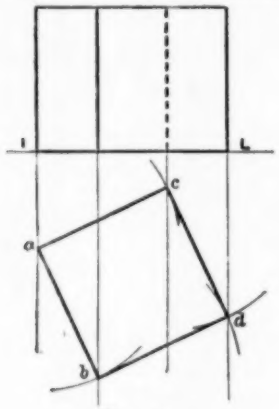


Fig. 47.

The plan is a square whose sides are equal to the height of the elevation, and whose corners are placed one on each of the four projectors. Fix *a* at pleasure, and, with the height as radius, mark *b* on the projector from the front edge, and *c* on that from the dotted or back edge. The same radius from *c* and *b* will cut the fourth projector at *d* and complete the plan.

THE NEW ARITHMETIC SYLLABUS.

BY T. P. SYKES,

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Scheme B.—This new scheme is introduced by the following remarks in the Instructions to Inspectors:—

'Many experienced teachers believe that the true progression in arithmetic is not to be found in advancing from addition and subtraction, to multiplication and division, with the large numbers often given in sums; but in graduated exercises beginning with small numbers and exhausting all their combinations. Such teachers will take, for example, the number 20, and after helping the scholars to count cubes or other objects, will dissect the number, find out in how many ways it is made up, learn its fractions and aliquot parts, apply it to money, length, hours and minutes, and perform all the arithmetical processes, both orally and in writing, which can be dealt with within that limit, higher numbers and more elaborate exercises in notation being reserved to a later stage. My Lords desire that teachers who adopt this view of arithmetical teaching should be at full liberty to give effect to it; and the alternative scheme (*b*) will be found to have been framed for this purpose.'

These are very sensible words. They have the ring of the true educator about them. This scheme B marks a distinct advance, educationally, in the teaching of Arithmetic. Looked at from a purely business point of view there is no mistaking the fact that the Education Department has succeeded in driving another hard bargain with teachers. The sum total of the work in all the Standards is considerably increased, whilst the pay for doing it remains the same. The additions are those of weights and measures and the mensuration of rectangular surfaces to Standard V., and the mensuration of rectangular solids to Standard VI. There is nothing cut out to balance these additions, as indeed nothing very well could be left out. The omission of weights and measures from any specific mention in the Code has always been a weak place. The want of a knowledge of these rules has always made itself felt in teaching compound practice.

The consequent instruction necessary has been looked upon as so much extra work added to the already overburdened syllabus of Standard V. The centre of gravity of Code Arithmetic has always lain in Standard V. In this new scheme B this disproportion of work between Standard and Standard is increased, and Standard V. again receives much more than its share. Mensuration of rectangular surfaces is a serious item. It involves the teaching of square root and opens the door to a large amount of work which may be made both difficult and complicated, such as reckoning the cost of carpeting floors, papering walls, and paving roads. Simple proportion is transferred to Standard VI., but this is no adequate relief compared with the additional work above mentioned.

One of the most serious considerations in the mind of the teacher is this overweighting of Standard V. A chain is no stronger than its weakest link. If one particular Standard promises to be a constant source of weakness and difficulty, teachers will pause before undertaking the new scheme. Especially will this be the case in those medium-sized schools where the upper standards have to be grouped for teaching, the school itself not being small enough to take Scheme S, and so have the Standards grouped for examination purposes.

The work of Standard VI. under this new scheme does not strike one as being any more difficult than under the old scheme. Yet on being examined closely it expands under the gaze. The mensuration of rectangular solids is a heavy item in itself, because of the difficult and complex questions that can be set. In Standard VII. there is a distinct increase of work. Possibly Standard VII. might not be looked upon as being overburdened if it could always command a separate teacher. But this is very rarely the case. It is quite an exceptional school where Standard VII. can be taught as a separate class by a separate teacher. In ordinary schools it is the rule to have a few children in Standard VII. working along with Standard VI., and possibly Standard V., in one class, all under the same teacher. Looked at from this standpoint the syllabus of work for these three upper Standards is disproportionately heavy.

The whole scheme has evidently been drawn up on the assumption that each Standard has a separate teacher, possibly working in a separate room. This is as true of the lower Standards as of the higher. No one will deny, for example, that the work of Standard I. as laid down in Scheme B is much more sensible and educational than at present. The weary grinding away at simple addition and subtraction of three figures until all the children could be brought to toe the line, has been anything but educational. The work here has been largely mechanical, and as such could be entrusted to young and inexperienced teachers. This has been an important consideration in multitudes of small schools where staffs are down at a minimum, and often ineffi-

cient. Scheme B demands consistent, intelligent work throughout the year, such as can only be given by a skilled and experienced teacher. Given right conditions and the work can be made much more attractive and educational to the children. The same remark applies to the work of Standard II. In both these Standards the work under this new scheme must be continuously intelligent throughout the year, and the teaching must be direct. To say that this has not been absolutely necessary in the past, is to institute a very severe criticism upon the old scheme. Yet it is abundantly open to the charge. How could it be otherwise? In a school of 200 scholars, with an average attendance of 150, the staff may be Head Teacher, one Assistant, and one or two Pupil Teachers. Under such circumstances much work that can only be called purely mechanical must be done.

A very commendable feature in the work of the lower Standards is the limiting of the total numbers necessary to a much more manageable figure than at present. It is a question how far little children of seven to nine years of age can really go in their grasp of abstract numbers. Many of the so-called problems that are set to children in the lower Standards, are as much exercises in abstract quantities to them as are the algebraical letters used by adults. In Standards III. and IV. there is the same commendable feature, the figures to be dealt with being brought within much more manageable limits.

Scheme S of the New Code is made to apply to schools where the staff consists of less than four adult teachers. Schools with an average attendance below 250 or thereabouts are at liberty to adopt it. This is a distinct concession, although it is difficult to see how the work laid down in Stage I. of the scheme is to be accomplished by children in Standard I. A good deal of allowance will necessarily have to be made with regard to these children on examination day.

The important consideration underlying the whole matter is that of how the work will be examined. There is certainly more scope in these new schemes for the individuality of an inspector to show itself. The essential weakness of all Code schemes is that the exact work to be done is laid down, and the Government Grant necessary for carrying on of the business of school-keeping depends upon the judgment of an outsider as to whether or not that work has been done. And yet many, even among teachers, are heard to affirm that 'payment by results' is dead. They really ought to know better. Among the ancient Greeks there were the Sophists, who 'doled out culture in return for gold.' That is still essentially the position of the English Primary School Teacher. 'Payment by results' will never be dead so long as a single penny of Government Grant is dependent upon the annual examination. They are no friends to the cause of education who reiterate the false cry of peace! peace! when there is no peace. Teachers cannot afford to make experiments, even in the matter of instituting better schemes of work, so long as the Government Grant depends upon the production of sham paper results yearly. The risk is too great. Many teachers feel that it is better to—

'bear those ills we have
Than fly to others that we know not of.'

The attitude of teachers throughout the country should be war! war! until the iniquitous system is really swept away.

EXAMINATION OF A COUNTRY SCHOOL IN YORKSHIRE IN MAY 1893.

STANDARD I.

Reading.—Each child read a few lines from different pages in class reading books. No meanings asked.

Writing.—Transcribed from Standard I. book three lines.

Arithmetic.—Worked on slates the following sums, dictated by Inspector :—

I had 75 nuts and 37 nuts and 104 nuts, and then I ate 26 nuts. How many had I then left? Ans. 190 left.

From 301 take away 96. How many left? Ans. 205 left.

Mental.—How many ½d. buns for 6d.?

Spent 9½d. How much left out of 1s.?

What is the value of 2 florins?

How many shillings in 4 crowns?

I had 7 apples and 5 apples and 8 apples, and shared them equally among 4 boys. How many did each boy get?

6 times 12?

5 times 9?

4 times 8?

Recitation.—'A Spring Walk.' Examined with Standard II.

Geography—Taken with Standard II.

STANDARD II.

Reading.—From 'Royal Reader No. 2,' and 'Hughes's Standard Stories.' Each child read about a dozen lines, and was questioned on the meanings of words.

Writing.—On slates, from 'Royal Reader': 'Elf at last became so clever a dog that on a wet day it would carry an umbrella in its mouth when it went for the children. Look at the picture, and you will see Elf, all ready to start for school. Sometimes boys in the street tried to take the umbrella from him.'

Arithmetic.—Sums dictated by Inspector :—

Add 2,010, 905, 17,068, 9,800, and 92. Ans. 29,875.

Divide 45,018 by 9. Ans. 5,002.

Take 17,009 from 50,000. Ans. 32,991.

There are 4 classes in a school. The 1st Class contains 50 boys and 30 girls. In each of the other 3 classes there are 35 boys and 20 girls. How many children in the school altogether?

Ans. 245 children.

Recitation.—'A Spring Walk.'

When does spring come?

What is a meadow?

What is a watermill?

What does 'amid' mean?

What did they find in the hedge?

What is a brook?

What colour is the celandine?

What is its shape like?

What is refreshing smell?

What is a mouldering castle wall?

What is ancient?

What are gloomy arches?

What is haze?

What is a landscape?

What is meant by its being alive?

Geography.—Standards I. and II. examined together.

What is this a plan of? (School.)

Show me where I am standing?

Show where the stove is? The table?

Point out the north wall? The west wall?

It is now 2 o'clock—where is the sun? Where was it at noon?

What do you call a piece of land like this with water all round it?

What is this piece with water nearly round it?

What is a desert?

What is a mariner's compass?

What is a tributary?

What is a bay?

What is an ocean?

What is a strait? Find a strait on map.

What large river is in Yorkshire?

On what river is London?

Mental Arithmetic.—How many shillings in 48 pence?—In 72 pence?—In 27 pence?

I buy 4 lbs. of 4d. sugar, and put down a florin to pay for it, how much change do I want?

How many ½d. buns for 2s.?

I had 3s. and spent 1s. 9d., how much have I left?

How many shillings in £3 10s.?

STANDARD III.

Reading.—From 'Nelson's Simple Stories from English History,' taken from different pages. Meanings of words required.

Writing.—From 'Simple Stories': 'Margaret had with her a number of jewels and costly vessels of gold and silver. She hoped to sell these, and with the money to raise another army. But her little band fell into the hands of robbers, who took from her all the precious things she had. She and Prince Edward once more escaped.'

Arithmetic.—From cards, partly in words, one straight forward sum in Compound Addition and Subtraction. And this problem:—

I had a £5 note. I bought a hat for 7s. 6d., a coat for £1 10s. 6d., and a pair of boots for 10s. 9d., what had I left out of the £5 note?

Ans. £2 11s. 3d.

Mental.—A man saves 10s. a week; how much in a year?

If he saved 11s. a week, how much in a year?

I live 1 mile away from school, and walk to and from school four times each day. How many miles do I walk in each week?

How many 6d. books can I buy with £2 15s.?

What will 7 yards cost at 3s. 9d. a yard?

I walk 1 mile in a quarter of an hour, if I walk for 3 hours how many miles have I walked?

Recitation.—'The Brook.' Who wrote this poem?

Where are the haunts of coot and hern?

What is a sudden sally?

What is it to bicker?

What is Thorp the name for?

What is meant by 'men may come and men may go'?

What are eddying bays?

What is a fairy foreland?

What are trout and grayling?

What is a hazel cover?

What are skimming swallows?

What are netted sunbeams?

What are sandy shallows?

What goes on for ever?

Geography.—What countries make up Great Britain?

What has England on the south?

What on the west?

What rivers should I have to cross in coming from Dover to Newcastle-on-Tyne?

Name some of the tributaries of the Yorkshire Ouse?

What manufactures are carried on round Leeds?

What is Hull?

Where are the Menai Straits?

Where is Liverpool?

Name the mountains in north-west of England?

What is the largest Welsh river?

Name some of the small rivers flowing into the English Channel?

Where are cotton goods made?

Name some openings on the South Coast of England?

STANDARD IV.

Reading.—From a strange book brought by the Inspector.

Writing.—From a card brought by Inspector.

Arithmetic.—Sums on cards partly in words:—

What will seventeen articles cost, each one £863 17s. 10½d.?

Ans. £14,686 3s. 6½d.

Seventy-three articles cost 17s. 3½d., find cost of one.

Ans. 2¾d. + 27 rem.

In 9 tons and 7 lbs. of sugar how many half ounces?

Ans. 645,344 half ounces.

6,000 apples are bought at 10 for a penny and sold at 6 for a penny. Find the profit?

Ans. £1 13s. 4d. profit.

Mental.—A man saves 12s. weekly, what does he save in a year?

26 books at 4d. each?

What is three-quarters of £1?

What is one-eighth of £1?

I gave away ½ and ⅛ of an apple, how much of the apple is left?

What are ¼, ½, and ⅝?

What are the aliquot parts of 1s.?

In 20 gallons how many half pints?

What part is ¾d. of a sovereign?

What part is 2 cwt. of a ton?

Recitation.—'Spanish Armada.' Standards IV. and V. together.

Geography.—British Isles and Australia. See Standard V.

STANDARD V.

Reading.—From a strange magazine brought by the Inspector. Subject: 'Scotland, Lochs, Balmoral,' &c.

Writing.—The following story from memory, told twice over by Inspector:—'An Irishman, who was very lazy and very poor, was suspected as a poacher. He got up very early one morning and went out to try to get something for his breakfast. To his dismay he saw his landlord coming directly up to him. Pat put on a bold face, and said, "Good morning, your honour, you are up very early this morning." The gentleman replied, "Yes, Pat, I am; the truth is, I have come out to get an appetite for my breakfast." Then, looking very suspiciously at Pat's pockets, he said, "And pray, Pat, what has brought you out so early this morning?" "Faith! your honour," replied Pat, "I have come out to find a breakfast for my appetite."'

Arithmetic.—Sums on Cards:—

Find the cost of 977 tons at £3 17s. 10d. a ton.

Ans. £3,802 3s. 2d.

A field measures 15 acres, 3 roods, and 15 poles. Find the number of square yards in one-fifth of the field.

Ans. 15,336¾ square yards.

Make out a bill for:—

90 dozen copy books at 1s. 6½d. dozen.
34 quires paper at 8¾d. quire.
26 Bibles at 1s. 8½d. each.
18 boxes instruments at 3s. 5½d. box.
20 dozen pen holders at 5 for 1½d.

Ans. £13 16s. 2½d.

Find the sum and difference of ⅔ and ⅞.

Ans. Sum 1 13/24, difference 7/24.

Mental.—100 books at 2s. 6d. each?

Spent ¾ of 4 crowns; how much left?

In ⅞ of a mile how many yards?

2½ lb. tea at 3d. per oz?

70 yards at half-a-crown a yard?

10s. a week; how much for 3 years?

5 tons at 5s. a cwt.?

Recitation.—Standards IV. and V. taken together.

The Spanish Armada; what was this?

Who fitted it out?

What was its object?

What does 'Invincible' mean?

Who was the Queen of England then?

What is Mexico?

What had the Spaniards done there?

What is Aurigny's Isle?

Who commanded our ships?

What is a sheriff?

Where is Belvoir?

What are burghers?

Where is Carlisle?

What became of the Spanish fleet?

Geography.—Name some rivers in Scotland that flow into the North Sea.

What are the chief Scottish lakes?

What is the largest city in Scotland?

What goods are manufactured there?

Name some seaports in Scotland.

What are the chief mountains?

On what river is Glasgow?

Why has the western coast of Scotland so many bays?

Name some Irish lakes.

Where is Belfast?

What is the largest bog in Ireland?

What are the divisions of Australia?

Name the principal bays.

What is the interior of Australia?

What is the principal export from Australia?

What mines are in Victoria?

Describe the animals of Australia. The plants.

What part of Australia is the hottest? Why?

Name the largest Australian river. Its tributaries.

What separates Australia from Tasmania?

Name the chief towns in Australia.

What do we get from New Zealand?

What kind of climate has New Zealand?

THE TILLER OF THE SOIL.

Tune, '*Back and sides go bare.*'

Moderato, f.

1st & 2nd T. 1. A har - dy sun - burnt man is he, A har - dy sun - burnt man, No

Bass.

Key B♭. *moderato, f.*

1st & 2nd T.	:d | d :—:d | d :—:d	d :—:d | d :—:m	r :—:d | t_1 :—:l_1	s_1 :—:— |—:—:s_1
	:m_1 | m_1 :—:m_1 | m_1 :—:l_1	s_1 :—:f_1 | m_1 :—:s_1	s_1 :—:l_1 | s_1 :—:fe_1	s_1 :—:— |—:—:m_1
	1. A har - dy sun - burnt	man is he, A	har - dy sun - burnt	man, No
B.	:d | d :—:d | d :—:f_1	m_1 :—:r_1 | d_1 :—:d	t_1 :—:d | r :—:r_1	s_1 :—:— |—:—:d

stur - dier man you'll ev - er see, Tho' all the world you scan. In

	l_1 :—:s_1 | l_1 :—:t_1	d :—:r | m :—:d	f :—:l_1 | t_1 :—:s_1	d :—:— |—:—	s
	f_1 :—:s_1 | f_1 :—:f_1	s_1 :—:s_1 | s_1 :—:s_1	f_1 :—:f_1 | f_1 :—:f_1	m_1 :—:— |—:—	s_1
	stur - dier man you'll	ev - er see, Tho'	all the world you	scan.	In
	f_1 :—:m_1 | f_1 :—:r_1	m_1 :—:t_2 | d_1 :—:m_1	f_1 :—:f_1 | s_1 :—:s_1	d_1 :—:— |—:—	t_1

sum - mer's heat, in win - ter's cold, You'll find him at his toil, Oh!

	f :—:m | r :—:f	m :—:r | d :—:s	f :—:m | r :—:d	r :—:— |—:—:s_1
	d :—:d | l_1 :—:d	d :—:t_1 | d :—:d	t_1 :—:d | t_1 :—:d	t_1 :—:— |—:—:m_1
	sum - mer's heat, in	win - ter's cold, You'll	find him at his	toil, Oh!
	l_1 :—:s_1 | f_1 :—:l_1	s_1 :—:f_1 | m_1 :—:m_1	r_1 :—:d_1 | s_1 :—:d	s_1 :—:— |—:—:d

far a - bove the knights of old, Is the till - er of the soil.

	l_1 :—:s_1 | l_1 :—:t_1	d :—:r | m :—:d.d	f :—:l | t_1 :—:s_1	d :—:— |—:—
	f_1 :—:s_1 | f_1 :—:f_1	s_1 :—:t_1 | d :—:d.d	l_1 :—:f_1 | f_1 :—:f_1	m_1 :—:— |—:—
	far a - bove the	knights of old, Is the	till - er of the	soil.
	f_1 :—:m_1 | f_1 :—:r_1	m_1 :—:s_1 | d :—:m_1.m_1	f_1 :—:f_1 | s_1 :—:s_1	d_1 :—:— |—:—

2. His stacks are seen on ev'ry side,
His barns are filled with grain,
Though others wait on fortune's tide,
He labours not in vain.
The land gives up its rich increase,
The sweet reward of toil,
And blest with happiness and peace,
Is the tiller of the soil.

3. He trudges out at break of day,
And takes his way along,
And as he turns the yielding clay,
He sings a joyful song.
He is no dull unhappy wight
Bound in misfortune's coil,
His smile is bright, his heart is light,
The tiller of the soil.

4. A hardy sunburnt man is he,
A hardy sunburnt man,
But who can boast a hand so free
As he, the tiller, can?
Nor summer's heat, nor winter's cold,
The power has him to foil,
Oh! far above the knights of old,
Is the tiller of the soil.

VITAL STATISTICS.

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66. *Sanitary Law, &c.*—Principles of Sanitary Law :—

1. No individual shall, for his own profit, poison his neighbour.

2. The State must assist the masses, where the latter are powerless.

3. Compulsion is justifiable where ignorance injures society.

4. Local government by the people, well informed by a central authority, is essential. The tendency of sanitary legislation is to place local sanitary regulations in the hands of Local Authorities, subject to the general superintendence of a government department —The Local Government Board.

5. The cost of permanent sanitary improvements should be borne, to some extent, by future generations.

67. *The Public Health Act* of 1875 consolidated all previous Sanitary Acts, with the exception of the Bakehouse Regulation Act, the Artisan's Dwelling Act (1868), the Baths and the Wash-houses Acts, and the Labouring Classes Lodging-houses Acts. England and Wales are divided into Urban and Rural Sanitary districts, subject to Urban and Rural Sanitary Authorities, which again are subject to the superintendence of the Local Government Board. (The latter Board was established in 1871, and consists of a President, of all the principal Secretaries of State, the Chancellor of the Exchequer, etc.) The jurisdiction of the Urban and Sanitary Authorities includes :—

1. The laying of sewers, drains, the disposal of sewage, etc. (clauses 13–41).

2. The scavenging and cleansing of streets, houses, etc. (clauses 42–50).

3. The question of water supply (51–70).

4. The regulation of cellar-dwellings and lodging-houses (71–90).

5. The prevention of nuisances, and the suspension of offensive trades (91–115).

6. The erection of hospitals for infectious diseases, and the prevention of infection (120–143).

7. The regulation of highways, streets, buildings, markets, and slaughter-houses (144–172).

8. The purchase of land for purposes of drainage, &c., the appointment of officers, the levying of district rates, the borrowing of money to defray expenses, etc. (173–269).

68. Every Urban Authority *shall* appoint a Medical Officer of Health, a Surveyor, and an Inspector of Nuisances or Sanitary Inspector (clause 189). Rural Authorities shall also appoint Medical and other Officers. It is the duty of the Medical Officer of Health (M.O.H.) to inquire into, and ascertain, as far as possible, the causes, origin, and distribution of diseases within his district; to advise the Sanitary Authority on all matters affecting the health of his district; to assist the Authority in the framing and subsequent working of such bye-laws and regulations as they may have the power to make; to prevent the extension of contagious and infectious diseases within his district; to inspect and examine any animal, meat, poultry, fish, etc., exposed for sale and intended for food of man, which is deemed to be diseased or unwholesome; to inquire into any offensive processes of trade carried on within his district; to prepare an annual report, etc. The Sanitary Inspector must keep himself informed in respect of the nuisances existing within his district that require abatement under the Public Health Act, 1875; on receiving notice of the existence of such, he must visit the spot and make inquiries; he must report to the Sanitary Authority any noxious or offensive business, trades, etc., established within his district; he must visit from time to time the butchers' shops and slaughter-houses; he must procure, when directed, samples of food and drink, and drugs suspected to be adulterated; he must give immediate notice to the M.O.H. of the occurrence of any contagious, infectious, or epidemic disease of a dangerous character; he must attend to the instructions of the M.O.H. with respect to any measures for preventing the spread of infectious disease, and must enter, in a book, particulars of his inspection, and of the action taken by him in the execution of his duties, etc.

69. *Sewerage, drainage, etc.* (Public Health Act, 1875).—Every Local Authority must have the sewers constructed, ventilated, and kept so that they shall not be a nuisance. The drainage of undrained houses must be enforced, such drainage being carried out to the satisfaction of the surveyor. Every Local Authority must see that the houses possess all necessary sanitary arrangements. Every Local Authority must purify the sewage before discharging it into streams. For the disposal of sewage, the Local Authority may construct works within its district or without after giving notice; in the latter case, by advertisement, and after giving notices on the owners or occupiers of the land which is required.

70. *The Cleansing of Streets, Houses, etc.* (42–50).—By virtue of these clauses, the Local Authority must provide for the cleaning of streets, and provide receptacles for the removal of rubbish, refuse, etc. Notice may be given to the owner or occupier of a house to whitewash and cleanse it, if certified by the M.O.H., in order to check the progress of infectious disease. Should the owner refuse, the authority itself may do it, and recover expenses. Also, the Authority may provide for the cleansing of offensive ditches, and for the removal of accumulations of filth.

71. *Water Supply.*—Local Authorities may construct waterworks, dig wells, or do any other necessary acts, or may hire any waterworks, or contract with any person for a supply of water. They must keep such waterworks in good order, so as to provide a wholesome supply of water, etc.

72. *Cellar-dwellings and Lodging-houses.*—Clauses 71–91 prohibit the occupation of cellars built or rebuilt after 1875. Existing cellar-dwellings (at that time, 1875) must be 7 feet high, and 3 feet of this must be above the surface of the street. There must also be 2 feet 6 inches space outside of, and existing all along, their entire frontage. They must be efficiently drained, must possess a fireplace with chimney or flue. Clause 76 provides for the registration of the addresses of all common lodging-houses. Such must first be inspected by some sanitary official. The Local Authority may make bye-laws for fixing the number of lodgers, for promoting cleanliness and ventilation of such houses, for the giving of notices, and the taking of precautions in the case of infectious disease, and to provide that each house has a proper water supply and drainage, and to compel the lime-washing of the walls, etc., in April and in October. By clause 84 the keeper of such house must give notice at once when a person is ill of fever, or any infectious disease, to the M.O.H.

73. *Nuisances and Offensive Trades.*—Of public nuisances, the sanitary law deals with those only which may be, or are likely to be, injurious to health. In some instances it is not, however, necessary to prove that it is injurious; for example, in the keeping of swine so as to be a nuisance the offence is complete without any proof of there being injury to health caused thereby. For a private nuisance the remedy is by action at law for damages; for a public nuisance, such as the pollution of rivers, or the inefficient treatment of sewage, where a larger proportion of the inhabitants suffer, an indictment should be preferred at common law, and then steps taken to obtain an injunction. In the Act of 1875 the following are defined as nuisances :—

(*a*) Insanitary premises, that is, houses with sanitary defects, as damp walls, absence or pollution of water supply, roofs which let in rain, defective sinks, drains not disconnected, etc.

(*b*) Any animal so kept as to be a nuisance, or injurious to health. This applies to pig-styes, dog-kennels, stables, etc.

(*c*) Any pool, ditch, water-course, drain, ash-pit, etc., so foul or in such a state as to be a nuisance or injurious to health. Whenever any watercourse, ash-pit, etc., is so foul, and situated near dwellings, or near a frequented path, as to evolve offensive odours, there is sufficient evidence to compel its removal, etc.

(*d*) Any accumulation or deposit which is a nuisance or injurious to health. This includes manure-heaps—close to dwellings or frequented roads—and other offensive deposits. But no penalty is to be imposed if the deposit be necessary for the carrying on of any business or manufacture, if it be proved that the deposit has not been kept longer than necessary, and that the best means have been taken for preventing injury to the public health thereby.

(*e*) *Overcrowding.*—Cases of overcrowding must be judged according to the circumstances, but 300 cubic feet space should be the highest *minimum* per head in sleeping rooms.

(*f*) Any *factory*, *workshop*, or *workplace* not kept in a cleanly state, or not ventilated in such a manner as to render harmless, as far as practicable, any gases, vapours, dust, or other impurities generated in the course of the work carried on therein, that are a nuisance or injurious to health, or so overcrowded while work is carried on, as to be dangerous or injurious to the health of those employed therein.

(*g*) Any chimney, etc., not being that of a private dwelling-house, sending forth black smoke in such a quantity as to be a nuisance.

Offensive Trades. — Certain trades which produce offensive effluvia are mentioned in Sections 112–115, see paragraph 51. Local authorities may restrict the establishment of such trades; make bye-laws with respect to them; make complaint before a justice if the effluvia evolved are certified to be a nuisance or injurious to health by the M.O.H. or by 10 inhabitants of the district. Before a conviction is obtainable, it must be proved that the best practical means for the abatement of the nuisance have *not* been adopted, &c. It may be said, generally, that (1) all offensive effluvia should

be destroyed in the fire ; (2) all refuse placed in closed receptacles ; (3) floors concreted with slope towards a gully, and kept clean, etc.

74. *Unsound Meat* (116–119).—These clauses empower the M.O.H. or S.I. (Sanitary Inspector) to inspect, at all reasonable times, any animal, carcase, meat, &c. exposed for sale and intended for food of man. The justice may condemn the same, and order them to be destroyed, and the person having such meat in his possession is liable to a penalty of £20.

75. *Infectious Diseases, Hospitals, etc.*—A local authority may require an owner to cleanse and disinfect a house, or may destroy infected bedding, clothes, etc. allowing compensation in the latter case. They may also provide a carriage for the conveyance of persons suffering from any infectious disease to a hospital or other place of destination. Any person, who while suffering from any dangerous infectious disorder, exposes himself without proper precautions against spreading the said disorder, in any street, shop, in public conveyance, or gives, lends, or sells any bedding, clothing, rags, or other things which have been exposed to infection, shall be liable to a penalty. Every owner or driver of a public conveyance shall immediately provide for its disinfection after it has, to his knowledge, conveyed any infected person. The keeper of an inn is responsible for letting any room if infected. By clause 131, a local authority may provide hospitals or temporary places for the reception of the sick of their district, and for this purpose they may build hospitals or contract for the use of them. Mortuaries also must be provided in connection with such hospitals. Any Sanitary Authority may recover the cost of maintenance of any patient treated in any such infectious hospital who is not a pauper. This is, however, rarely enforced, as tending to diminish their usefulness.

By clause 134, when any portion of the country appears to be threatened with, or is affected by, any formidable epidemic, endemic, or infectious disease, the Local Government Board may make temporary regulations for—

(*a*) Speedy interment of the dead.
(*b*) House-to-house visitation.
(*c*) The provision of medical aid, and for disinfection, ventilation, &c.

76. According to clause 157 any Urban Authority may make bye-laws (*a*) with respect to the level, width, and construction of new streets and the sewerage thereof ; (*b*) with respect to the structure of the walls, foundations, roofs, chimneys, &c. of *new buildings* ; (*c*) with respect to a sufficiency of space about buildings, to secure a free circulation of air, and with respect to their ventilation. In the cutting-up of London estates for building purposes, the Metropolitan Building Acts provide that every carriage road shall have a width of at least 40 feet, that an open space of at least 150, 200, 300, or 450 square feet, or more, shall be left at the rear, or on the side of every dwelling, according as the house has a frontage of 15, 20, 30, or more feet, unless all the rooms can be lighted or ventilated from a street, alley, or adjoining space. In the provision of space around the dwellings, attention should also have been directed to their height, and the amount of space regulated accordingly, (*d*) with respect to the drainage, etc. of buildings. In pursuance of this section *model* bye-laws have been issued by the Local Government Board.

77. Clause 166 enables a local authority (*a*) to provide a market place, (*b*) make convenient approaches to it, and provide all necessary adjuncts. By clause 169 slaughterhouses may be provided and regulated. The remaining clauses deal with the election and duties of officers, the mode of conducting business, rating and borrowing powers, legal proceedings, and other miscellaneous provisions.

78. The *Rivers' Pollution Prevention Act* (1876) provides for the prevention of pollution of the rivers and streams in Great Britain. The word 'stream' includes the sea to such an extent, and tidal waters to such a point, as shall be determined by the Local Government Board. The sources of pollution are—

(1) The solid refuse of any manufactory, manufacturing process, or any rubbish or cinders. (2) Any solid or liquid sewage matters, or any poisonous, noxious, or polluting liquid from any manufactory process or factory. The Local Authority must give facilities for the draining of factories into the sewers. (3) Any solid matter from any mine likely to interfere with the flow of the stream, or any solid or liquid poisonous, noxious or polluting matter from such mine. 'Solid matter,' however, *shall not* include particles of matter in suspension in water, and 'polluting' *shall not* include innocuous discolouration.

79. *Sale of Food and Drugs Act* (1875–1879).—(1) The word 'food' shall include every article used for food or drink by man, other than drugs or water : and the word 'drug' shall include medicines for internal and external use.

(2) No person shall mix, colour, stain, etc., any article of food with any ingredient, so as to render the article injurious to health, and any person who shall sell such article, so mixed, shall be liable to penalties.

(3) No person, except for the purpose of compounding, shall mix, etc., any drug with any ingredient so as to injuriously affect the quality or potency of such drug.

(4) No person shall sell any article of food or any drug which is not of the *nature, substance,* or *quality* of the article demanded. In the amending Act, 1879, it is stated, that spirits must not be diluted more than 25 degrees under proof, for brandy, whisky, or rum, or 35 degrees under proof for gin.

(5) For the purposes of the Act, analysts were appointed, who analyse the article, and their certificates are evidence for the prosecution.

80. By *The Canal Boats Act* (1877) the Local Government Board may appoint certain Sanitary Authorities to register boats belonging to canals within their districts, to fix the number, age, and sex of the persons dwelling in the boats. Regulations are provided for the cleanliness and ventilation of such boats, and the prevention of the spread of infectious diseases.

81. The *Public Health (Water) Act* (1878) was passed for the benefit of rural districts. It enacts that it *shall* be the duty of every Rural Authority to see that every occupied dwelling-house within its district has, within a reasonable distance, an available supply of wholesome water, sufficient for the consumption and use for domestic purposes of the inmates. If the supply be deficient, or non-existent, the Authority may serve a notice on the owner, requiring him to provide a supply within six months. The Act also forbids the erection or rebuilding of any house in a rural district, unless there is provided a wholesome and adequate supply of water. There are other regulations with regard to water rates, etc.

82. *Artisans and Labourers Dwelling Act* (1868), Improvement Act (1875), Housing of the Working Classes Acts (1885 and 1890).—The object of these Acts is to provide better dwellings for Artizans and Labourers. By the first, or Torrens Act of 1868, the M.O.H. reports, if he finds any premises in a condition dangerous to health or unfit for habitation. The Surveyor inspects and reports to the Local Sanitary Authority as to whether the evils can be remedied by alteration and rebuilding, or the premises should be pulled down. Plans and specification of costs are then made ready by the Local Authority and sent to the owners. If necessary to demolish the property, notice must be given to the owners, and the process must be completed within three months. This Act applies to the whole kingdom. The Improvement Act (1875) applies to the slums of London and the larger towns of England and Ireland. The former Act applied to individual buildings, the latter to blocks of buildings, and so-called unhealthy areas. The Local Authorities, in these cases, must first formulate a scheme of improvement, which they must enforce. The owner erects the necessary buildings and makes the necessary improvements, or the Authority may purchase the land, and then let or sell it, binding the purchaser or lessee to carry out the intended scheme. Should the Local Authority build the houses out of the funds provided by the Act, they must be sold within ten years. In order to raise the money, the Local Authority may mortgage the property, or may borrow it from the Public Works Loan Commissioners. It has since been amended by Acts of 1882, and a Royal Commission was appointed in 1884. As a result, the Housing of the Working Classes Act, 1885, extending the above Acts to all Urban Sanitary Districts, was passed. In 1890 Mr. Ritchie passed a consolidating and amending Act, dealing with unhealthy areas, dwelling-houses, and working class lodging-houses (Housing of the Working Classes Act, 1890). This Act includes the above Acts with some additions. The object of the bill is to make owners of insanitary property responsible for its condition, and to compel them to put those houses in a habitable state, if they wish to avoid a closing order. The M.O.H. *must* report to the local authorities such houses and areas, and the Local Authorities *must* ordor periodical surveys of their district. The responsibility of the owner is particularly emphasized.

83. *Alkali Acts* (1863–1874, etc.)—By the first Act, the term 'alkali-work was held to mean every work for the manufacture of alkali, sulphate of potash, or soda in which hydrochloric acid is evolved.' Amending Acts have added to the above 'the formation of any sulphate in the treatment of copper ores by common salt or other chlorides,' The object of the Acts is to prevent the hydrochloric and other gases from escaping. According to Section IV., 1863, 95 per cent. of HCl gas evolved must be condensed. The second Act provided that each cubic foot of air, smoke, or chimney gases escaping shall not contain more than $\frac{1}{10}$ grain of hydrochloric acid. The Act of 1874 provides also for the prevention of the discharge of all other 'noxious gases' arising from such works. The term 'noxious gas' is held to mean any of the following : sulphuric acid, SO_3 (except that arising from the combustion of the sulphur in coal), nitric acid, and other oxides of nitrogen, chlorine, &c. Inspectors were appointed to enforce these regulations. Before penalties are inflicted, 10 days previously, notice is to be given as to non-compliance, and means described to remedy the fault. Accord-

ing to the Act of 1881, the acid drainage and alkali waste must be kept apart, and the alkali waste deposited must not become a nuisance.

84. *Factory and Workshop Acts* (1878, 1883, &c.) enact that every factory and workshop shall be kept in a cleanly state, and free from effluvia, shall not be overcrowded, and shall be ventilated so as to render harmless all gases, vapours, dust, and that they shall be limewashed once every year. The Act of 1883 emphasizes the case of bakehouses, and the drainage of such. *The Epidemic and other Diseases Prevention Act* of 1883 is put into force for definite periods only, and whenever any part of England appears to be threatened with any formidable epidemic or dangerous disease. The Local Government Board make regulations then for (*a*) speedy interment, (*b*) house to house visitation, (*c*) medical aid, (*d*) ventilation and disinfection, etc. It was primarily intended to guard against the introduction of cholera.

85. *The Bakehouse Regulation Acts*, 1863, provided that the inside walls and ceilings of bakehouses must be either painted with three coats of paint, and be re-painted once every seven years, and washed with hot water and soap at least every six months, or lime-washed once every six months; that every bakehouse shall be kept in a cleanly state, properly ventilated, and free from effluvia rising from any drains or other nuisance; that it shall not be employed as a sleeping place, unless under the special conditions mentioned. A Medical Officer of Health may now enter any retail bakehouse for inspection, and take proceedings if necessary.

86. *The Public Health (London) Act*, 1891, consolidates and strengthens the sanitary law of London, and introduces a number of amendments. Such an Act was needed, as London was excluded from the Act of 1875. The County Council of London may, in some instances, undertake any duty which a Sanitary Authority in the Metropolis neglects. Moreover, appeals to the County Council, on behalf of persons hardly dealt with by the decisions of the Sanitary Authorities, are permitted.

Sections 1–18 deal with nuisances, offensive trades, and dairies. The nuisances which may be summarily abated for the purposes of the Act are those mentioned in paragraph 73, *a*, *b*, *c*, *d*, *e*, *f*. Another is included, viz., any such absence from premises as *water fittings*, as is a nuisance defined by Metropolitan Water Act of 1871. The word premises includes buildings, land, hereditaments of any tenure. Information of a nuisance may be given by *any person*. Every officer of the Sanitary Authority and the Relieving Officer must give information. On receipt of the information (Clause 4), the S.A. (sanitary authority) serves a notice on the person who causes the nuisance, or the occupier or owner of such premises, etc., and the S.A. may specify any works to be done in order to abate the nuisance. It is therefore not necessary, as before, to prove the injury before taking proceedings. If not abated, the S.A. *shall* make a complaint, and the Petty Sessional Court may then make a summary order on such person, which may be one of abatement, of prohibition, or of closure.

Clause 16 empowers S.A. to make bye-laws for the prevention of nuisances arising from snow, dust, ashes, rubbish, and filth in the streets, (*b*) for preventing nuisances arising from any offensive matter running out of any manufactory, brewery, slaughter house, knacker's yard, butcher's, etc., into any uncovered place. Clause 19 deals with offensive businesses, and enacts that if any person establishes anew the business of blood-boiler, bone-boiler, manure-manufacturer, soap-boiler, tallow-melter, or knacker, or the business of fell-monger, tripe-boiler, slaughterer of cattle or horses (which are offensive businesses under the Act), except by consent of the County Council, shall be liable to a penalty of 50*l*.

Section 20 deals with the Licensing of Cow-houses and Slaughter-houses. All such must be registered, and the S.A. has the right to enter a slaughterhouse or knacker's yard at any hour in the day-time. The removal of house and street refuse by the S.A., when collected and deposited, is also deemed an offensive business, and must be conducted under similar precautions so as not to become a nuisance.

87. Clause 23 deals with *Smoke-consumption*. Every furnace employed in the working of engines by steam; every furnace employed in any public bath or wash-house; or in any mill, factory, iron-foundry, distillery, sugar refinery, bakehouse, gas works, shall be constructed so as to consume the smoke arising from such furnace. The owner or occupier of such premises where smoke is not burnt, or where noxious or offensive effluvia are occasioned, and where the best practical remedies are not used, is liable to a penalty. By clause 25 the S.A. may serve notices on occupiers of workshops, etc., to limewash, cleanse, and purify them, if necessary. Clauses 26–28 deal with bakehouses and dairies. Sections 29–36 are devoted to the removal of refuse and the cleansing of streets. The S.A. must keep all streets, including the *foot-ways*, properly swept and cleansed. Section 47 deals with *unsound food*. Any M.O.H. or S.A. may enter premises and examine any article intended for food of man. Any unsound article may be seized, and condemned by the Justice. If a butcher, etc., has any article in his possession unfit for food, he may give notice to the S.A., and request its removal.

88. *Provisions as to Water.*—Clause 48 enacts that an occupied house without proper water supply is a nuisance, and may be dealt with summarily. Other clauses *compel* S.A. to make bye-laws with regard to the cleanliness and freedom from pollution of tanks, cisterns, etc., used for the storing of water likely to be used by man for drinking or domestic purposes. Any person engaged in the manufacture of gas who wilfully or *negligently* does an act connected with such employment whereby the water in any source of water supply is fouled, is liable to a penalty.

89. *Notification of Infectious Diseases etc.* (55–74).—Where the inmate of any house is suffering from an infectious disease, the head of the family to which such inmate belongs shall send notice at once to the M.O.H.; and every medical practitioner attending on or called to visit the patient shall forthwith send to the M.O.H. a certificate to that effect. The M.O.H. must send a copy of the certificate to the head teacher of the school attended by the patient, if a child. The expression 'infectious disease' is held to include small-pox, cholera, diphtheria, erysipelas, scarlet fever, typhoid fever, membranous croup, etc. The S.A. may add to the number other diseases for notification if they think fit. Every S.A. in London must provide premises and apparatus for the destruction or disinfection of articles which have been infected by any *dangerous* infectious disease. By section 60, if the M.O.H. certifies that the cleansing and disinfecting of any house is necessary to check any dangerous infectious disease, the S.A. *shall* serve notice on the master or owner, and unless he informs them within 24 hours, that he will do so, or having informed the authority, he fails to do so, the house shall be cleansed and disinfected by the officers and *at the cost* of the S.A. The latter, too, must provide temporary accommodation for members of the family compelled to leave their dwelling under such circumstances. Penalties are enforced where persons let houses in which infected persons have been lodging, and for making false statements. Section 66 enacts that persons so infected, if without proper lodging, may, on a certificate signed by a medical man, be removed to a hospital, and at the cost of the S.A., and there detained until all fear of infection is over. A penalty of £10 may be imposed on persons, who, knowing themselves to be suffering from a dangerous infectious disease, engage in milking, fruit-picking, and the like. Section 71 enables the M.O.H. to inspect any dairy if the milk supply is apparently spreading an infectious disease, and, if accompanied by a veterinary surgeon, he may inspect the animals therein; also, if necessary, the sale of milk from the dairy may be stopped for the time. Section 3 of the Infectious Diseases (Notification Act), 1889, which provides for the notification to the M.O.H. of the occurrence of infectious diseases amongst the inmates of any house, exempts hospitals in which infectious diseases are received. By the present Act the exemption no longer applies. Every S.A. may provide for the use of the inhabitants of their district hospitals, temporary or permanent, and carriages for the conveyance of infected persons, &c.

90. By section 94 every S.A. in London *shall* make and *enforce* such bye-laws as are requisite for (*a*) fixing the number of persons occupying a house let in lodgings; (*b*) the registration of such; (*c*) infection; (*d*) enforcing efficient drainage, cleanliness, and ventilation; (*e*) cleansing and lime-washing, (*f*) the taking of precautions in case of infectious disease. Clauses 96–98 deal with underground rooms. There must be outside, and adjoining such, and extending along its frontage and upwards from 6 inches below the level of the floor, an open paved area of at least *four* feet wide in every part, and three feet of the height of such rooms must be above the surface of the street. The area must be drained efficiently; the room must be provided with sanitary arrangements, and sufficiently ventilated. The area of window must be at least one-tenth that of the floor area of the room.

91. *Addenda.*—The Vital Statistics for 1891 were issued in January 1893. The death-rate for 1891 was 20·2 per 1,000, and exceeded those of the last 10 years. The increase was due to the epidemic of influenza. The mortality of 1891 presents a very high death-rate at the older-age periods, and a lower death-rate at the earlier-age periods. The zymotic death-rate was a little higher than usual. The deaths recorded from influenza in 1891 were 16,000, but no doubt this number only inadequately represents the violence of the scourge. The marriage-rate showed an increase upon those of recent years, and the birth-rate was 31·0 per thousand.

92. The 'natural increment' of population is represented by the excess of births over deaths, the 'actual increment' is only determined by the census. The mean age at death (see PRACTICAL TEACHER for January, paragraph 5) is no test of longevity or of sanitary excellence, since it fluctuates largely, varying with the pro-

portion of young and old. Where the birth-rate is high, the mean age at death is low.

93. The amount of moisture or watery vapour in the air is determined by the hygrometer. The *dew point* is the temperature at which the air is just saturated by the aqueous vapour contained in it. The hygrometric state is the ratio of the tension of the aqueous vapour present in the air at that time, to the tension which would be exerted by the amount of vapour necessary to saturate it. Mason's wet and dry bulb hygrometer is generally used. It consists simply of two thermometers, one kept dry, the other bulb covered with muslin connected with a piece of cotton dipping into distilled water. Tables are constructed which show the relative humidity or hygrometric state. The temperature of the dry bulb thermometer is read, and the temperature of the wet bulb, and the difference between them. On looking at the tables the humidity can be at once determined. The relative humidity is of importance, since the amount of aqueous vapour influences the temperature. Climates with moist air are more equable with regard to day and night, and also sun and shade.

94. An adult man evolves about ·56 cubit foot of CO_2 per hour at night during repose; ·78 in the daytime with moderate exertion, and 1·5 cubic foot per hour during hard work, giving a ratio of 1, 1½, and 3. The amount of CO_2 in the air is taken as the measure of impurity when vitiated by respiration, and the standard of purity in dwelling-houses, etc., has been fixed at 0·2 CO_2 per 1,000 volumes of air as a maximum or limit. Beyond this, the air is no longer fresh to the smell. A formula has been given to determine the amount of fresh air required (in cubic feet) for ventilation purposes. Thus:—

$$d = \frac{(m - n)\, c}{n}$$

Where d is the amount of fresh air required, c the air-space in cubic feet, m the amount of CO_2 in 1,000 volumes produced, n the limit of respiratory impurity, viz., 0·2 per 1,000 volumes. This formula gives the cubic space an unnecessary importance, and it has been simplified thus:—

$$c = \frac{r}{n}$$

Where r is the amount of CO_2 inhaled by one individual in an hour, n as before, and d. For instance, r is 0·6.

Hence $d = \frac{0{\cdot}6 \times 1000}{0{\cdot}2} = 3000$ cubic feet of air required per hour.

95. *Corrections.*—On page 493, line 7, second column, paragraph 9, read—

$$\frac{m}{p} + \sqrt[2]{\frac{m\ n}{p^3}}$$

and $$\frac{m}{p} - \sqrt[2]{\frac{m\ n}{p^3}}$$

that is between + and $- \sqrt[2]{\frac{m\ n}{p^3}}$

On page 540, second column, line 13, for '*cisteris*,' read '*cæteris*.'

On page 542, first column, line 13, 'for causes of typhoid,' read 'causes of typhus.'

At end of paragraph 42, section 5, on cholera, read 'On arrival, the rags should be disinfected in the steam apparatus.'

Questions set by Science and Art Department.

(23) What are the chief provisions of the Public Health (Water) Act, 1878? (Honours, 1887.)

(24) For what purposes have Local Authorities powers under the Public Health Act to make bye-laws for houses let in lodgings? Frame a code of such bye-laws. (Honours, 1888.)

(25) What are the provisions of the Public Health Act for the prevention of the spread of infectious diseases? (Honours, 1889.)

(26) What are the chief provisions of the Rivers' Pollution Prevention Act, and what are the important special definitions in this Act? (Honours, 1890.)

(27) What are the bye-laws of the Local Government Board for securing the sufficiency of open space about new buildings to ensure a free circulation of air around them? Discuss their adequacy from a health point of view. (Honours, 1891.)

(28) What are (*a*) nuisances, (*b*) offensive trades, under the Public Health (London) Act, 1891? (Honours, 1892.)

(29) What diseases of cattle render their meat unfit for the use of man? State what you know about the effects produced by the consumption of tainted or putrefying meat, and by what substances they are caused? (Honours, 1891.)

(30) What are the methods for determining the amount of moisture in the air? How is the amount expressed? What is the importance of it? (Honours, 1888.)

(31) How much work in foot tons from a diet of cooked beef 10 oz., bread 24, butter 1, potatoes 20 oz.? (Honours, 1887.)

(32) How much CO_2 is exhaled per hour at repose and in work? How much fresh air required per hour to keep an air-space well ventilated. (Honours.)

L'AVARE.

(*Molière.*)

TRANSLATED BY PROFESSOR DARQUÉ.—(*Author of 'Pupil Teachers' French Course.'*)

L'AVARE.

CLÉANTE. Comment va notre affaire? Les choses pressent plus que jamais; et, depuis que je t'ai vu, j'ai découvert que mon père est mon rival.

LA FLÈCHE. Votre père amoureux?

CLÉANTE. Oui, et j'ai eu toutes les peines du monde à lui cacher le trouble où cette nouvelle m'a mis.

LA FLÈCHE. Lui, se mêler d'aimer! De quoi diable s'avise-t-il? Se moque-t-il du monde? Et l'amour a-t-il été fait pour des gens bâtis comme lui?

CLÉANTE. Il a fallu, pour mes péchés, que cette passion lui soit venue en tête.

LA FLÈCHE. Mais par[105] quelle raison lui faire un mystère de votre amour?

THE MISER.

CLÉANTE. How does our business get on? Matters are more urgent than ever; and, since I last saw you, I discovered that my father is my rival.

LA FLÈCHE. Your father in love?

CLÉANTE. Yes, and I had all the difficulty in the world to hide from him the confusion into which this news has thrown me.

LA FLÈCHE. He, think of love! What the deuce is he thinking of? Is he jesting? And was love made for people of his stamp?

CLÉANTE. It has been necessary for my sins that this passion should enter his head.

LA FLÈCHE. But for what reason do you hide your love from him?

NOTES.

([105]) *Par quelle raison.* This mode of expression is now obsolete; most people say *pour quelle raison*, or *pourquoi*.

CLÉANTE. Pour lui donner moins de soupçon, et me conserver, au besoin, des ouvertures plus aisées pour détourner ce mariage. Quelle réponse t'a-t-on faite ?

LA FLÈCHE. Ma foi, monsieur, ceux qui empruntent sont bien malheureux ; et il faut essuyer d'étranges choses, lorsqu'on en est réduit à passer, comme vous, par les mains des fesse-mathieux ![106]

CLÉANTE. L'affaire ne se fera point ?

LA FLÈCHE. Pardonnez-moi. Notre maître Simon, le courtier qu'on nous a donné, homme agissant et plein de zèle, dit qu'il a fait rage[107] pour vous, et il assure que votre seule physionomie lui a gagné le cœur.

CLÉANTE. J'aurai les quinze mille francs que je demande ?

LA FLÈCHE. Oui, mais à quelques petites conditions qu'il faudra que vous acceptiez, si vous avez dessein que les choses se fassent.

CLÉANTE. T'a-t-il fait parler à celui qui doit[108] prêter l'argent ?

LA FLÈCHE. Ah ! vraiment, cela ne va pas de la sorte. Il apporte encore plus de soin à se cacher que vous, et ce sont des mystères bien plus grands que vous ne pensez. On ne veut point du tout dire son nom, et l'on doit aujourd'hui l'aboucher avec vous dans une maison empruntée, pour être instruit, par votre bouche, de votre bien et de votre famille; et je ne doute point que le seul nom de votre père ne rende les choses faciles.

CLÉANTE. Et principalement notre mère étant morte, dont[109] on ne peut m'ôter le bien.

LA FLÈCHE. Voici quelques articles qu'il a dictés lui-même à notre entremetteur, pour vous être montrés avant que de rien faire :

Supposé que le prêteur voie toutes ses sûretés, et que l'emprunteur soit majeur, et d'une famille où le bien soit ample, solide, assuré, clair et net de tout embarras ; on fera une bonne et exacte obligation par-devant un notaire, le plus honnête homme qu'il se pourra et qui, pour cet effet, sera choisi par le prêteur, auquel il importe le plus que l'acte soit dûment dressé.

CLÉANTE. Il n'y a rien à dire à cela.

LA FLÈCHE. *Le prêteur, pour ne charger sa conscience d'aucun scrupule, prétend ne donner son argent qu'au denier dix-huit.*[110]

CLÉANTE. Au denier dix-huit ? Parbleu ! voilà qui est honnête. Il n'y a pas lieu de se plaindre.

LA FLÈCHE. Cela est vrai.

Mais comme ledit prêteur n'a pas chez lui la somme dont il est question, et que, pour faire plaisir à l'emprunteur, il est contraint lui-même de l'emprunter d'un autre, sur le pied du denier cinq,[111] *il conviendra que ledit premier emprunteur paye cet intérêt, sans préjudice du reste, attendu que ce n'est que pour l'obliger que ledit prêteur s'engage à cet emprunt.*

CLÉANTE. In order to give him less suspicion, and preserve for myself, if need be, easier means of preventing this marriage. What answer did they make you ?

LA FLÈCHE. Really, sir, those who borrow are very unfortunate ; and one has to put up with strange things when one is reduced, as you are, to deal with skin-flints.

CLÉANTE. Will not the transaction be done ?

LA FLÈCHE. Pardon me. Our Mr. Simon, the broker who has been assigned to us, a most active and zealous man, says that he has left no stone unturned for you, and he asserts that your face alone has won his heart.

CLÉANTE. I shall have the fifteen thousand francs (£600) that I ask for ?

LA FLÈCHE. Yes, but on some trifling conditions that it will be necessary for you to accept, if you intend to do this business.

CLÉANTE. Has he made you speak with him who is to lend the money ?

LA FLÈCHE. Oh! indeed, that is not the way they do business. He takes still more care than you to hide himself, and they are far greater mysteries than you think. He will not at all tell his name, and you are to be brought together to-day in another man's house, in order that he may hear from you all about your property and your family; and I do not at all doubt that your father's name alone will render matters easy.

CLÉANTE. And chiefly our mother being dead, whose estate cannot be taken from me.

LA FLÈCHE. Here are some of the conditions which he dictated himself to our go-between, that they may be shown to you before doing anything :

Supposing that the lender see all his securities, and the borrower be of age, and of a family whose estate be ample, solid, sure, clear, and free from any liabilities ; a good and exact deed shall be drawn by a notary, the most honest man that can be found, and who, to that effect shall be chosen by the lender, to whom it is most important that the deed be duly drawn.

CLÉANTE. There is nothing to say to that.

LA FLÈCHE. *The lender, in order not to load his conscience with any scruples, intends to give his money at only a trifle over five per cent.*

CLÉANTE. A trifle over five per cent.? To be sure ! That is honest. There is no occasion to complain.

LA FLÈCHE. That is true.

But as the said lender has not by him the aforesaid sum, and as, in order to please the borrower, he is himself obliged to borrow it of somebody else, at the rate of twenty per cent., it will be right that the said first borrower should pay that interest, irrespective of the rest, because it is only to oblige him that the said lender makes that loan.

(106) *Fesse-mathieux.* An allusion to the evangelist Matthew's occupation—tax collector—before he became one of Christ's disciples.

(107) *Rage*, literally, 'hydrophobia.'

(108) *Doit.* When the verb *devoir* is followed by an infinitive, it is intended to convey the likelihood or probability of the thing expressed by that infinitive.

(109) *Dont* is now generally used next to its antecedent.

(110) *Au denier dix-huit*, that is to say, that one is to be paid as interest for every eighteen lent.

(111) *Sur le pied du denier cinq*, that is to say, one shall be paid as interest for every five lent.

CLÉANTE. Comment diable ! quel Juif ! quel Arabe est-ce là ? C'est plus qu'au denier quatre.[112]

LA FLÈCHE. Il est vrai ; c'est ce que j'ai dit. Vous avez à voir là-dessus.

CLÉANTE. Que veux-tu que je voie ? J'ai besoin d'argent, et il faut bien que je consente à tout.

LA FLÈCHE. C'est la réponse que j'ai faite.

CLÉANTE. Il y a encore quelque chose ?[113]

LA FLÈCHE. Ce n'est plus qu'un petit article.

Des quinze mille francs qu'on demande, le prêteur ne pourra compter en argent que douze mille livres ; et, pour les mille écus restans,[114] *il faudra que l'emprunteur prenne les hardes, nippes et bijoux, dont s'ensuit le mémoire, et que ledit prêteur a mis, de bonne foi, au plus modique prix qu'il lui a été possible.*

CLÉANTE. Que veut dire cela ?

LA FLÈCHE. Écoutez le mémoire :

Premièrement, un lit de quatre pieds, à bandes de point de Hongrie, appliqués fort proprement sur un drap de couleur d'olive, avec six chaises et la courte-pointe de même : le tout bien conditionné, et doublé d'un petit taffetas changeant rouge et bleu.

Plus, un pavillon à queue, d'une bonne serge d'Aumale rose sèche, avec le mollet et les franges de soie.

CLÉANTE. Que veut-il que je fasse de cela ?

LA FLÈCHE. Attendez.

Plus, une tenture de tapisserie, des amours de Gombaud et de Macée.[115]

Plus, une grande table de bois de noyer, à douze colonnes ou piliers tournés, qui se tire par les deux bouts, et garnie par le dessous de ses six escabelles.[116]

CLÉANTE. Qu'ai-je à faire, morbleu. . . .

LA FLÈCHE. Donnez-vous patience.

Plus, trois gros mousquets tout garnis de nacre de perle, avec les trois fourchettes[117] *assortissantes.*

Plus, un fourneau de brique, avec deux cornues et trois récipients, fort utiles à ceux qui sont curieux de distiller.

CLÉANTE. J'enrage.

LA FLÈCHE. Doucement.

Plus, un luth de Bologne, garni de toutes ses cordes, ou peu s'en faut.

Plus, un trou-madame et un damier, avec un jeu de l'oie, renouvelé des Grecs, fort propres à passer le temps lorsque l'on n'a que faire.

Plus, une peau de lézard, de trois pieds et demi, remplie de foin : curiosité agréable, pour pendre au plancher[118] *d'une chambre.*

Le tout ci-dessus mentionné valant loyalement plus de quatre mille cinq cents livres, et rabaissé à la valeur de mille écus, par la discrétion du prêteur.

CLÉANTE. What the deuce ! What a Jew ! What a curmudgeon is that ? It is more than twenty-five per cent.

LA FLÈCHE. It is true. That is what I said. You are to see to that.

CLÉANTE. What will you have me see ? I want money, and I must consent to everything.

LA FLÈCHE. That is the answer I made.

CLÉANTE. Is there anything else ?

LA FLÈCHE. Only a small item.

Of the six hundred pounds which are asked for, the lender will be able to give in cash only four hundred and eighty pounds ; and for the remaining one hundred and twenty pounds, the borrower will have to take the clothes, linen, and jewels, the list of which follows, and which the said lender has put, in good faith, at the lowest possible price.

CLÉANTE. What does that mean ?

LA FLÈCHE. Listen to the memorandum :

Firstly, a four-post bed, with stripes of Hungarian lace, most neatly sewn, of an olive-green cloth, with six chairs and quilt to match : the whole in good condition, and lined with shot-coloured red and blue silk.

Plus a bedstead canopy, of good Aumale serge, dry pink (old rose), with the valance and silk fringe.

CLÉANTE. What does he want me to do with that ?

LA FLÈCHE. Wait.

Plus a set of tapestry hangings of the loves of Gombaud and Macée.

Plus a large walnut-tree table, with twelve turned columns or pillars, which can be extended at both ends and furnished underneath with its six stools.

CLÉANTE. Zounds, what need have I . . .

LA FLÈCHE. Be patient.

Plus three large muskets, entirely adorned with mother-of-pearl, with the three props to match.

Plus a brick furnace, with two retorts and three receivers ; very useful to those who wish to distil.

CLÉANTE. It makes (drives) me mad.

LA FLÈCHE. Gently.

Plus a Bologna lute fitted with all its strings, or very nearly.

Plus a nine-holes and a draught-board, with a game of goose, revived from the Greeks, well calculated to spend one's time when one has nothing to do.

Plus one lizard's skin, three feet and a half long, stuffed with hay ; a pleasing curiosity to hang from the ceiling of a room.

The whole of the things mentioned above being really worth more than one hundred and eighty pounds, and reduced to the price of one hundred and twenty pounds through the discretion of the lender.

(112) *Au denier quatre*, or one as interest for every four lent.

(113) Notice the use of the affirmative sentence, which renders the question more emphatic.

(114) *Restans.* It was formerly customary to drop, in the plural, the final *t* of all nouns, and of the masculine adjectives ending in *ant* and *ent : un enfant prudent, des enfans prudens.* Such an omission is no longer allowed.

(115) *Des amours de Gombaud et de Macée.* This was the title of a pastoral which was very popular at that time.

(116) *De ses six escabelles*, other reading, *de ses escabelles.*

(117) *Fourchettes*, literally, 'forks.'

(118) *Plancher*, literally, 'floor.' Few houses had ceilings in Molière's time.

CLÉANTE. Que la peste l'étouffe avec sa discrétion, le traître, le bourreau qu'il est ! A-t-on jamais parlé d'une usure semblable ? et n'est-il pas content du furieux intérêt qu'il exige, sans vouloir encore m'obliger à prendre, pour trois mille livres, les vieux rogatons qu'il ramasse ? Je n'aurai pas deux cents écus de tout cela ; et cependant il faut bien me résoudre à consentir à ce qu'il veut ; car il est en état de me faire tout accepter, et il me tient, le scélérat, le poignard sur la gorge.

LA FLÈCHE. Je vous vois, monsieur, ne vous en déplaise, dans le grand chemin justement que tenait Panurge [119] pour se ruiner, prenant argent d'avance, achetant cher, vendant à bon marché, et mangeant son blé en herbe.

CLÉANTE. Que veux-tu que j'y fasse? Voilà où les jeunes gens sont réduits par la maudite avarice des pères ; et on s'étonne, après cela, que les fils souhaitent qu'ils meurent !

LA FLÈCHE. Il faut avouer que le vôtre animerait contre sa vilenie le plus posé homme du monde. Je n'ai pas, Dieu merci, les inclinations fort patibulaires, et, parmi mes confrères que je vois se mêler de beaucoup de petits commerces, je sais tirer adroitement mon épingle du jeu [120] et me démêler prudemment de toutes les galanteries qui sentent tant soit peu l'échelle ; mais, à vous dire vrai, il me donnerait, par ses procédés, des tentations de le voler ; et je croirais, en le volant, faire une action méritoire.

CLÉANTE. Donne-moi un peu ce mémoire, que je le voie encore.

CLÉANTE. The deuce take him with his discretion, the traitor, the cruel man that he is ! Has anyone ever spoken of such an usury ? and is he not satisfied with the exorbitant interest that he requires, without wishing besides to compel me to take, for one hundred and twenty pounds, the old rubbish which he picks up ? I shall not get twenty-four pounds for all that; and yet I must make up my mind to consent to what he wants; for he is able to make me accept everything, for the ruffian bullies me into it.

LA FLÈCHE. I see you, sir, may it not displease you, just on the high road which Panurge took to ruin himself, by taking money before hand, buying dear, selling cheap, and spending his income before it was due.

CLÉANTE. How can I help it ? That is what young men are reduced to through the cursed avarice of their fathers ; and people wonder after that that the sons should wish them to die !

LA FLÈCHE. It must be admitted that yours would rouse against his avarice the steadiest man in the world. I have not, thank God, such inclinations as will bring me to the gallows, and, among my fellow-servants whom I see undertake many risky transactions, I know how to get out of scrapes, and prudently to extricate myself from all doings which savour a little of hanging; but to tell you the truth, his proceedings would tempt me to rob him ; and I should think, by robbing him, I was doing a deserving action.

CLÉANTE. Just give me that memorandum that I may see it again.

(To be continued.)

(119) One of the well-known personages in Rabelais' 'Pantagruel.'

(120) *Tirer adroitement mon épingle du jeu*, literally, 'to skilfully draw one's pin from the game.'

CONVERSATIONAL LESSONS IN CHEMISTRY.

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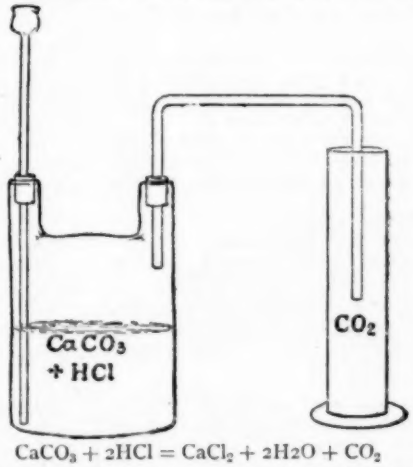
FOR particulars of the list of chemicals and PRACTICAL TEACHER set of apparatus for working the experiments referred to in these lessons *see* numbers for January and February, 1893.

LESSON VII.—*Carbon Dioxide.*

We have frequently spoken of one oxide of carbon. Name it. Carbon dioxide. How did we say it was prepared ? From marble and vitriol. Can anyone put that answer into chemical language ? I can, sir, for marble is calcium carbonate and vitriol is sulphuric acid. What does the acid do to the marble ? It breaks it up. Well, once again perform the experiment. There is the apparatus figured on the board.

Now let us see what we can find out about this gas by actual experiment. You, Frank, take a jar with a little lime-water in it, and try to pour the CO_2 from one of the jars into the lime-water. Have you succeeded ? Yes, for see the lime-water is milky. What have you learnt ? That CO_2 is heavier than air. Next let Arthur pass the CO_2 into water to which he will after a time add lime-water. What have you found out ? That CO_2 is soluble in water. What shall he do next ? I know, sir ; he will see if the solution is acid. How ? By putting some litmus solution into the jar. Well, you shall do that as a reward for your answer. Now all look ! Is it an acid ? I see some say 'yes,' some say 'no,'



$$CaCO_3 + 2HCl = CaCl_2 + 2H_2O + CO_2$$

and I am not surprised at this, as the solution is only weakly acid, and does not make the litmus red, but purple. What is the name of this acid ? Carbonic acid. Yes, and its name is briefly written thus—H_2CO_3. Now I want you to closely observe the following two names :—

$CaCO_3$	H_2CO_3
Chalk, Marble, or Limestone.	Carbonic Acid.

What is the difference between them? One contains calcium where the other has hydrogen. Just so. You may say that the first body is formed from the second by substituting a metal (calcium) for the H of the acid. Please note that such bodies are called *salts*, and you may readily see that a salt is related on the one hand to a metal, and on the other to an acid; marble, for example, is spoken of as the calcium salt of carbonic acid. Now let us examine three other very common bodies. Take this, John, and tell me what you think it is? It is common salt. Now Fred, what do you think your specimen is? It is saltpetre, according to the name on the bottle. Well, and what is yours Herbert? It is Epsom salts. Quite so, and now please direct your attention to the blackboard, and notice that these bodies are salts according to our definition.

$NaCl$ (Common salt). The sodium salt of hydrochloric acid. It is called sodium chloride.
KNO_3 (Saltpetre). The potassium salt of nitric acid, or potassium nitrate.
$MgSO_4$ (Epsom salts). The magnesium salt of sulphuric acid, or magnesium sulphate.
$CaCO_3$ (Chalk, limestone, or marble). The calcium salt of carbonic acid, or calcium carbonate.

Try to remember this definition, as we are constantly referring to salts in our chemical work.

Make a solution of salt and another of saltpetre, Willie, and divide each portion into two parts, and test one of each couple with blue, and the other with red, litmus. What do you observe? That there is no change whatever. Very good; now refer to your grammar, thinking of gender, and tell me what sort of bodies salts are, if they are neither acid like vitriol, nor yet alkaline like ammonia. I suppose, sir, you wish us to describe them as neutral bodies. Yes; and that nearly all salts are neutral you will find as you multiply experiments of this kind. But now return to chalk, and tell me why you can get CO_2 from it. Because it contains it; that is, because it is calcium carbonate. Stay, here are ammonium carbonate, iron carbonate, magnesium limestone, which is carbonate of lime, and carbonate of magnesium. Can you obtain CO_2 from them? Try, and then answer. Well, Frank? I have got CO_2 as the turbid lime-water shows. So have I, sir. Yes, you all have succeeded, and I want you to carefully consider what you may learn from these experiments. Consider now that the carbonates are broken up or decomposed. What brings about this decomposition? An acid. Yes; you might have said *any acid;* and if any acid will decompose carbonates we can always get CO_2 from a carbonate by adding an acid to it. Here, George, is a piece of stone. Is it a carbonate or no? How can I tell, sir? That is just what I want you to tell me. I *can* tell you, sir. Please lend me a glass rod. I dip it in an acid, and let a drop of the acid fall on the stone. It is a carbonate, for I can see the gas coming off. What! can you see CO_2? No; I do not mean that, but I can see the little bubbles it makes in forcing its way through the acid. What do we call such bubbling out? I know, sir; it is just the same as in sherbet, and that is called an effervescent drink, so that we should call the bubbling *effervescence*. Well, remember how to detect a carbonate, and also how to prepare CO_2. Can you think of any other way of getting the dioxide. Yes, sir; by burning carbon in air, or in oxygen. Where then is CO_2 always forming? In fires and furnaces. Quite so. Suppose there happened to be very little air and much carbon, do you think that CO_2 would form then? Why yes, sir; but only in small quantities. Suppose I tell you that there are two oxides of carbon, one with more, the other with less, O, which should you expect to be formed then? The one with less O. Yes; and we speak of these oxides as carbon monoxide (CO), and carbon dioxide (CO_2). Bear in mind that both can be produced by burning C, the former in a limited, and the latter in an unlimited, supply of air. CO_2 can also be produced by the oxidation, or burning in air, of CO. To this we shall refer later on. Where else have we said that CO_2 is found? It is found in the air, sir. Well, what have you to say, Frank? We breathe out CO_2, sir, and plants breathe out CO_2, and also decompose CO_2, taking the carbon to make starch and other substances, and setting free the O. Well, you have certainly put that very nicely, and I think we shall all remember that whilst we poor mortals, in common with all animals, are vitiating the air by charging it with the deleterious CO_2, plants are doing this it is true, but also undoing it by converting some of the CO_2 thus produced into C and O, thus purifying the air. Ah, I see you are inclined to say, 'Three cheers for the plants,' Charlie; but we will postpone that. Now, is CO_2 a poison? You do not know, I see. Very good; consider what happens when a great number of people are crowded in a room, as in the case of the Black Hole of Calcutta. What do you think killed those 123 poor people? You think it was CO_2, do you, Arthur, whilst Frank says it was want of O. I shall agree with Frank, for do we not constantly breathe in CO_2, and also when we drink soda-water or lemonade, or any such effervescent drinks we are taking in CO_2; as these mineral drinks are simply solutions of CO_2 with various flavouring substances. Hence Frank was right in saying that CO_2 is not a poison, although it causes suffocation when breathed in place of O. Oxygen starvation however cannot be called poisoning. In beer and wine making, that is in fermentation, alcohol and CO_2 are formed, and CO_2 is also abundantly present in the earth. Sometimes it collects in a great quantity in caves. This is the case at the Grotto del Cane, near Naples, into which a man may enter, but not a dog, for reasons that you can well understand. Before descending wells or disused mines, it is customary to let down a burning candle. If the candle goes out, it is presumed that CO_2 is present in a large quantity, and no one will venture to descend. For the same reason descent into a coal-mine after one of the dreadful explosions, in which CO_2 is always formed, is nothing short of heroism. The collier calls CO_2 the after-damp.

SCHOLARSHIP FRENCH.

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NOTES AND VOCABULARY TO 'LA JEUNE SIBÉRIENNE.'

67.35.—*peuvent*, pres., ind., 3 pl. of *pouvoir*, be able.

67.40.—*oubliés*, past part., masc., pl. of *oublier*, forget. Past part. is masc. pl., because it agrees in gend. and numb. with dir. obj. *les* preceding.

67.40.—*peut-être—obtiendra-t-elle leur grâce*, perhaps she will obtain their pardon. When a sentence commences with *aussi* = therefore, *peut-être*, *à peine*, *en vain*, and a few other phrases, the subject of the verb, if a pronoun, is placed after the verb.
obtiendra, fut., 3 sing. of *obtenir*, obtain.

67.40.—*engagerons*, fut., 1 pl. of *engager*, persuade.

68.3.—*le lendemain*, on the next day. (*Le* is misprinted *de* in Darqué's edition.)

68.7.—*feldjègre*. This word is taken from the German *feldgäger* (lit. 'field-huntsman'). Translate it 'courier.'

68.8.—*le capitaine ispravnick*. Translate this, 'the captain ispravnick.' This official is a governor of a district.

68.16.—*chaumière*, noun, fem., sing.; hut.

68.17.—*s'assirent*, pret., 3 pl. of *s'asseoir*, sit down.

68.19.—*se dire*, say to each other. *Se* is here dative, and is used in a reciprocal sense.

68.20.—*pesait*, pres., ind., 3 sing. of *peser*, weigh.

68.23.—*Depuis deux heures ils souffraient*, for the last two hours they had been suffering. To represent, as here, a state which was continuing in some past time, the French use *depuis* with the imperfect tense.

68.23.—*à la fois—et;* both—and.—*à la fois* = lit., 'at the time.'

68.24.—*que leur présageait un sombre avenir*, which a gloomy future foreboded to them. The subj. is placed here after the predicate, because the sentence commences with *que*.

68.26.—*lueur*, noun, fem., sing.; glimmer.

68.26.—*vint*, pret., ind., 3 sing. of *venir*, come.

68.29.—*auprès de*, near.

68.30.—*amie*, adj., fem., sing.; friendly.

68.32.—*ouvres*, imperat., 2 pl. of *ouvrir*, open.

68.34.—*Aucune langue ne peut décrire*, no tongue can describe. *Aucun* followed by *ne* = the adj. 'no.'

68.37.—*entrecoupées*, past part., fem., pl. of *entrecouper* = broken (*i.e.* by sighs, sobs, &c.).

68.38.—*Que Dieu le bénisse*, may God bless him! or, better still, 'God bless him!' The subjunctive is used in this way in simple and principal sentences to express a wish.

68.42.—*êtres*, noun, masc., pl.; beings.

68.43.—*jamais il n'exista*, never did there exist. *Il* is used in an impersonal sense here.

68.43.—*de passage*, lit., 'any passage.' Translate, 'a passage.' *De*, after a negative (*jamais-ne*) = any.

68.46.—*appris*, past part. of *apprendre*, learn.

69.2.—*courut*, pret., ind., 3 sing. of *courir*, run, hasten.

69.6.—*écrivait*, impf., ind., 3 sing. of *écrire*, write.

69.10.—*y avait pourvu*, had provided for it; *pourvu*, past part. of *pourvoir*, provide.

69.11.—*faite*, past part., fem., sing. of *faire*, to make. Past part. is fem. sing., because it agrees with the dir. obj. *que* (=*offre*), which precedes it.

69.11.—*lors de*, at the time of.

69.13.—*joint à sa lettre*, lit., 'joined to her letter.' Translate, 'enclosed in her letter'; *joint*, past part. of *joindre*, to join.

69.20.—*voile*, noun, masc., sing.; veil. But *la voile* = the sail.

69.24.—*écrivit*, pret., 3 sing. of *écrire*, write.

69.26.—*pour se rendre*, lit., 'to betake herself.' Translate, 'to go.'

69.27.—*auprès d'elle*, to her. Lit., 'near her.'

69.30.—*pour lui réserver*, to reserve for her.

69.31.—*Lopouloff et sa femme étaient à Nijeni depuis quelque temps*, Lopouloff and his wife had been at Nijeni for some time. See 58.23.

69.34.—*qui s'était rendue*, who had gone.

69.36.—*N'a-t-on point de nouvelles?* Lit., 'has not one any news?' Translate, 'are there no news?'

69.39.—*nous en avons de bonnes*, we have some good ones.

69.41.—*conduisit*, pret., 3 sing. of *conduire*, lead.

69.41.—*le long des cloîtres*, along the cloisters.

69.43.—*les religieuses*, the nuns.

69.45.—*sans le sourire de bienveillance*, had it not been for the benevolent smile. Notice this peculiar use of *sans*.

70.2.—*à la fois* with *et* (in the next line) = both—and. See 68.23.

70.4.—*devant elle*, before her. The preposition 'before' is translated by *devant*, referring to place, and *avant* referring to time.

70.8.—*qui a tout fait*, who has done everything. *Rien* and *tout*, when direct objects, are placed between the auxiliary and the past participle, if the verb is compound.

70.9.—*Remercions*, imperat., 1 pl. of *remercier*, to thank. Translate, 'let us think.'

70.14.—*actions de grâce*, thanksgivings.

70.17.—*succédèrent à*, followed. *Succéder* = 'to follow,' and requires *à*. 'To succeed,' in the sense of 'to be successful,' is *réussir*.

70.21.—*dont jouissait la famille Lopouloff*, which the Lopouloff family enjoyed. *Dont* (= of which) is required, because *jouir* takes *de* after it.

70.24.—*qu'avait embrassé Prascovie*, which Prascovie had embraced.

70.31.—*des parents*, some relatives.

70.33.—*contraignit*, pret., 3 sing. of *contraindre*, force.

70.33.—*à prendre ce dernier parti*, to take this latter step. *Prendre un parti* = to take a resolution, a course, a step.

70.41.—*A quoi nous a servi?* Lit., 'to what has served us?' Translate, 'what use has been to us?'

70.46.—*Que ne sommes nous?* Why are we not? When *que* commences a sentence and means 'why?' *ne* without *pas* stands for the negative. This form is only used to express a reproach or a regret.

71.5.—*de ses proches*, from one's relatives.

71.10.—*prenant*, pres. part. of *prendre*, take.

71.12.—*promit*, pret., 3 sing. of *promettre*, promise.

71.12.—*d'aller leur faire visite*, to go and pay them a visit.

71.13.—*dans le courant de l'année*, in the course of the year.

71.21.—*prévenir*, vb., inf.; to prevent.

71.27.—*au travers de la grille*, at the grating. Lit., 'through the grating.' *Au travers de* = through.

71.29.—*appartient*, pres., ind., 3 sing. of *appartenir*, belong.

71.32.—*qu'il vous bénisse!* May he bless you! See 68.38.

71.34.—*émue*, past part., fem., sing. of *émouvoir*, move.

71.36.—*hors d'elle-même*, beside herself.

71.37.—*s'élança*, pret., 3 sing. of *s'élancer*, rush.

71.37.—*en sanglotant*, lit. 'in sobbing,' or 'whilst sobbing.' Translate, 'sobbing.'

71.40.—*entonnèrent*, pret., 3 pl., of *entonner*, to *intone*, begin singing.

71.47.—*s'assujettit*, lit. 'subjected herself.' Translate, 'submitted.'

71.51.—*de plus en plus*, more and more.

71.53.—*qui s'affaiblissait*, lit., 'which was weakening itself.' Translate, 'which was getting weaker.'

72.1.—*état*, noun, masc., sing.; condition, calling.

72.2.—*poitrine*, noun, fem., sing.; chest.

72.6.—*Après que*, after. This is the *conjunction* 'after.' The *preposition* 'after' is simply *après*.

72.8.—*de changer de séjour*, to change her residence. *Changer* is followed by *de*.

72.10.—*résolut*, pret., 3 sing. of *résoudre*, resolve.

72.11.—*outre*, prep.; beyond, besides. This preposition is from the Latin *ultra*, beyond.

72.17.—*devint*, pret., 3 sing. of *devenir*, become.

72,19.—*se conformant aux convenances*, acting in conformity with the propriety.

72.20.—*qu'exigeait d'elle son nouvel état*, which her new calling required of her. Notice again how, when the direct object *que* of the relative pronoun commences a sentence, the subject (*état*) is placed after the predicate.

72.21.—*elle ne se répandit point dans la société*, lit. 'she did not spread herself into society.' Translate, 'she did not go into society.'

72.26.—*traits*, noun, masc., pl.; features.

72.27.—*étisie*, noun, fem., sing.; phthisis, consumption.

72.28.—*sourdement*, adv.; secretly.

72.28.—*dans cet état même*, in that very state. The adj. *même* when following its noun = very.

72.79.—*dépérissement*, noun, masc., sing.; wasting away, decline.

72.29.—*il eût été difficile*, it would have been difficult. The imperfect subjunctive of *avoir* and *être* may be used instead of a conditional.

72.33.—*bien prise*, well proportioned; lit., 'well taken.' *prise*, past part., fem., sing. of *prendre*, to take. It agrees in numb. and gend. with *taille*, to which it refers.

72.36.—*le front découvert*, a high forehead. *Découvert*, here translated 'high,' is literally 'uncovered' (*i.e.* with hair).

72.38.—*jusque*, adv.; even.

72.45.—*journée*, noun, fem., sing.; day's work. This is the literal sense of our word 'journey.' This may be seen in the word 'journeyman,' a man who is paid by the day.

72.46.—*qui lui est due*, which is due to her. *due*, past part., fem., sing. of *devoir*, to owe.

73.1.—*se disposèrent*, pret., 3 pl. of *se disposer*, prepare.

73.2.—*veille*, noun, fem., sing.; day before, eve.

73.6.—*escalier*, noun, masc., sing.; staircase.

73.7.—*assise*, past part., fem., sing. of *asseoir*, to seat. Agrees in gend. and numb. with *fille*.

73.8.—*marches*, noun, fem., pl.; steps.

73.10.—*laquais*, noun, masc., sing. ; servant. This French word has been adopted from our word *lackey*.

73.10.– *à livrée*, in livery.

73.14.—*n'a d'autres secours que*, lit. 'has of other help only.' Translate, 'has no other means than.'

73.17.—*pourrai*, fut., 1 sing. of *pouvoir*, be able.

73.17.—*prit*, pret., 3 sing. of *prendre*, take.

73.21.—*Elle se souvint aussitôt du temps malheureux*, she immediately remembered the unfortunate time. *se souvint*, pret. 3 sing. of *se souvenir*, to remember. *Se souvenir* is followed by *de*.

73.23.—*où*, in which.

73.28.—*émut*, pret., 3 sing. of *émouvoir*, touch, move (when speaking of *feelings*, etc., which move us).

73.33.—*de faire du bien*, to do good.

73.36.—*Avant de partir*, before setting out. The preposition 'before' when followed by an infinitive in a gerundial sense, is *avant de*.

73.37.—*qui défend aux novices*, which forbids novices. *Défendre* (something) *à* (someone)=To forbid a person to do something.

73.47.—*Celle-ci*, the latter.

73.47.—*s'était particulièrement liée*, had become particularly intimate. See note on 66.45.

74.2.—*s'efforça*, pret., 3 sing. of *s'efforcer*, to try hard ; to make every effort.

74.4.—*avait obtenu*, lit., had obtained. Understand 'permission' after it.

74.4.—*de changer de monastère*, to change her monastery. See 72.8.

74.8.—*y consentit*, lit. 'consented to it.' *Consentir* is followed by *à*. Translate, 'gave her consent.'

74.20.—*il ne s'en trouva point de vacante*, there were not any vacant (lit. 'of vacant'). For the analysis of the construction *il ne s'en trouva point*, see note on 35.35.

74.27.—*qui ne s'accordaient pas*, which did not agree.

74.29.—*dont elle jouissait*, which she enjoyed. See note on 70.21.

74.30.—*jusqu'en* 1809, until 1809.

74.32.—*quoique elle-même en eût fait le sincère sacrifice*, although she herself had made the sincere sacrifice of it. The subjunctive *eût* is required after the conjunction *quoique*.

74.37.—*pour laquelle*, for which. 'Which' is translated by *laquelle* because it follows a preposition.

74.37.—*il n'est plus de remède*, there is no longer any remedy. *Il* is used impersonally here.

74.41.—*comme*, as if.

74.41.—*pour lui cacher*, to conceal from it.

74.44.—*se promena*, pret., 3 sing. of *se promener*, walk.

74.46.— *à l'ordinaire*, usual.

74.48.—*s'assit*, pret., 3 sing. of *s'asseoir*, sit down.

74.51.—*écoulés*, past part., masc., pl. of *écouler*, pass away.

74.54.—*printemps*, noun, masc., sing. ; spring. From Lat. *primum tempus*, first or earliest time.

75.4.—*n'est-ce pas ?* will you not? Lit., 'Is it not?' This phrase would be used to express 'will he not,' 'will they not,' &c., &c., whatever the person of the noun or pronoun might be.

75.9.—*prêtes*, adj., fem., pl. of *prêt*, ready. Agrees in gender and number with *larmes*, tears.

75.18.—*parlaient haut*, were talking aloud.

75.18.—*riaient*, impf., 3 pl. of *rire*, laugh.

75.19.—*dans le but*, for the purpose.

75.20.—*tant de monde*, so many persons.

75.30.—*comme elle en avait l'habitude*. Lit., 'as she had the habit of it.' Translate, 'as she was in the habit of doing.'

75.33.—*près de son lit*, near her bed.

75.33.—*se mit à chanter*, begin to sing.
Se mettre à = to begin.

75.35.—*versets*, noun, masc., pl. ; verses (of the Bible). But a verse of a song is *couplet*.

75.43.—*de temps en temps*, from time to time.

75.46.—*revinrent*, pret., 3 pl. of *revenir*, return.

75.50.—*elle était morte*, she had died. Both *naître*, to be born, and *mourir*, to die, form their compound tenses with *être* instead of *avoir*.

Final Revision.

Look up all the preceding points, and revise all the terminations of regular verbs. Remember the accents on the plural of the preterite indicative and the 3rd pers. sing. of the imperfect subjunctive.

Learn, in addition, the following irregular verbs :—*Envoyer, dormir, fuir, ouvrir, servir, asseoir, mouvoir, prévoir, savoir, valoir, croire, écrire, dire, lire, mettre, naître, plaire, résoudre, vivre, devoir.*

Examination Paper.

1. Translate into English : A cette époque, ses traits étaient *déjà* fort altérés par l'étisie prononcée qui *la* minait sourdement ; mais, dans cet état *même* de dépérissement, il *eût* été difficile de trouver une physionomie *plus* agréable, et surtout plus interessante, que la sienne. Elle était d'une taille moyenne, mais bien *prise ;* son visage, entouré d'un voile noir qui couvrait tous ses cheveux, était d'un bel ovale. Elle avait les yeux très-noirs, le front découvert, une certaine tranquillité *mélancolique* dans le regard et *jusque* dans le sourire.

2. Parse the words underlined.

3. Give the feminines of *mon, ingrat, leur, vaincu ;* the preterite, 1 pl., of *vouloir, payer, devoir, aller, avoir ;* the plurals of *fils, roi, jeu, ciel.*

4. Name some neuter verbs which employ the verb *être* with the past participle, and point out the consequent difference as to the agreement of the past participle with the subject of the sentence.

5. Translate into French :—

(*a*) How are you, my little friend?
(*b*) I went on foot to my brother's.
(*c*) I have been learning French for two years.
(*d*) I do not know the gentleman of whom you are speaking.
(*e*) They are writing their lessons.
(*f*) Has the teacher corrected your exercises?
(*g*) Mary entered the house.
(*h*) I am glad that you have brought your sister.

N.B.—Examination Papers must be sent in *as early as possible* this month, in order that they may be returned corrected before the Scholarship Examination.

ANSWERS TO THE JUNE PAPER.

1. They kept the young girl to dinner. Several guests arrived gradually, and displayed the liveliest interest in her. At the moment in which they were going to sit down to table, the relative who has been mentioned presented himself suddenly in the dining-room, saying, 'Christos voscres' (Christ is risen), in accordance with the custom of Eastertide. There was no other explanation than the most sincere embraces.

2. *plusieurs*, adj. of number, masc., plural, agreeing with *convives* in number and gender.
témoignèrent, pret., ind., 3 pl. of 1st conjugation verb *témoigner*, agreeing in numb. and pers. with its subject *convives*.
dont, relative pronoun, 3rd pers., sing., masc., agreeing with its antecedent *parent*, genitive case, depending on vb. *parlé*.
y eut, pret., ind., 3 sing. of impersonal irregular verb *y avoir*.
d', partitive adjective to noun *explication*, fem., sing., following negative verb *il n'y eut point*.

3.

	Preterite 2 pl.
venir	*vous vintes*
vendre	*vous vendîtes*
faire	*vous fîtes*
mourir	*vous mourûtes*
boire	*vous bûtes*
pouvoir	*vous pûtes*
rendre	*vous rendîtes*

4.

Plu.	*Sing.*
Yeux	Oeil
maux	mal
oiseaux	oiseau

5.

	Sing.	*Plu.*
Nominative	Il	Ils
Genitive	De lui	D'eux
Dative	Lui	Leur
Accusative	Le	Les
	Sing.	*Plu.*
Masc.	Mon	Mes
Fem.	Ma	Mes

6. (*a*) Cela n'en vaut pas la peine.
(*b*) Quelqu'un vous a-t-il dit cela?
(*c*) J'espère qu'il fera beau demain.
(*d*) A quoi pensez-vous?
(*e*) Donnez-moi cette plume et ces papiers.
(*f*) La cloche a sonné il y a quelque temps.
(*g*) Il n'est que quatre heures et quart.

In concluding this series of papers on Scholarship French, we beg to acknowledge thankfully the many kind things that have been said about them by students who have been following the PRACTICAL TEACHER course. We trust that the results of the coming examination may show that they have been of some service to those who have used them.

[*N.B.—The rules referred to will be found in the* PRACTICAL TEACHER *for September*, 1892.]

SCIENCE NOTES.

CLOUD PHOTOGRAPHY.—A French photographer, M. Angot, has recently succeeded in taking some beautiful photographs of cirrus clouds. The blue colour of the sky was 'stopped out' with coloured screens, consisting of a solution of ten parts of sulphate of copper, and one part of bichromate of potassium, to which a few drops of sulphuric acid were added. When placed in front of the lens of the camera, this screen, with orthochromatic plates, was found to give excellent results.

***

ELECTRICITY IN THE ARTS.—Electricity continues to make headway in the arts. In the yard of M. Sartre, at Lyons, a steam-towing barge is in course of construction, in which the iron tow-chain is held to the pulleys or drums which it passes over by magnetism, excited in the nick or gorge of the pulley by means of the electric current. The friction of the chain is thus greatly augmented, and instead of the chain having to pass over a number of pulleys, one is sufficient to give the necessary grip. In New York an electrical rocking-chair has lately been brought out. The chair is propelled by the current from a dynamo, and the occupant can at the same time receive gentle currents through the body, either by grasping metal handles in the ordinary way, or by resting the bare feet on metal pedals.

***

ASBESTOS POTTERY.—Asbestos earthenware and pottery form a quite recent departure in ceramics, but their use will become popular and spread, for every day a new discovery in the quality of the ware, or a new industrial application appears to be discovered. A species of earthenware is now manufactured from asbestos powder, which is reported to possess a grain of a fineness hitherto not attained by any china ware. While its colour varies according to the treatment to which the asbestos has been subjected, it is generally similar to that of terra-cotta, and statuettes are being made of unvarnished asbestos ware. As filters for water, wine, beer, and alcohol, earthenware prepared from asbestos is far superior to other kinds of earthenware. Acids have absolutely no effect on asbestos pottery. The best asbestos comes from Siberia. It is also met with in the clefts of certain rocks in the Tyrol, in the Pyrenees, in the mountains of Hungary, in Greenland, and in Brazil. The finest description comes from Tarantaise, in Savoy, and forms filaments more than fifty centimetres in length. Important beds of this mineral occur in the Alleghany and Appalachian mountains, veins of it being frequently found which are fifty centimetres thick. Canadian asbestos is also of a very satisfactory quality.

***

THE INFLUENCE OF ENVIRONMENT.—An interesting example of the influence of environment is afforded by the rabbit, whose extraordinary increase in Australia has occasioned so much anxiety to the agriculturist there. Already, it is stated, that the fore-paws of some have become adapted for climbing trees in search of the food which they are unable to find on the surface of the ground, and some have begun to litter on the bare ground. The rabbit of the Antipodes is also reported to enter the water and swim very well, either when pursued or during his migrations.

***

THE NEW HYDRO-CYCLE.—The water bicycle has been for several years in our midst without attracting more than an inconsiderable share of popularity. The awkwardness of its appearance compared with the trim look of a rowing boat, and the slow rate of speed attainable on it, have had a great deal to do with its want of favour. In the new water cycle, Zimer's patent boat, the occupant rides on a saddle, and the treadles, actuated by his feet, work either a propeller or a stern paddle-wheel. The horizontal bar with which the bicycle has made us familiar is held by the rider, and its movement causes paddles to work alternately on either side of the cycle. The inventor claims that his hydro-cycle is far more efficient in a rough sea than an ordinary rowing boat, while it is less fatiguing to use, and calls for the exercise of very little skill. In pace it is also a great advance on the ordinary water bicycle.

***

THE ORIGIN OF CYCLONES AND ANTI-CYCLONES.—The meteorological theories of a famous Austrian meteorologist, Hann, are now exciting a good deal of attention. As the result of observations made by him for several years in succession on the top of the Sonnblick (a peak of the Tyrolese Alps 12,000 feet high), and also on several other high-level stations, he has come to the conclusion that a cyclone cannot be due to a local heating of the earth's surface and to an ascending current of warm air provoked by this cause, nor on the other hand can an anti-cyclone arise from a local cooling of the earth's surface and a consequent condensation of the air. Hann points out that the ascending column of air within a cyclone up to a height of about 10,000 feet is not warmer than the surrounding air. On the contrary, it is cooler within the cyclone. The upward motion of the column cannot therefore be due to its temperature. Since also in an anti-cyclone the descending current of air is warmer than it is under normal conditions, its downward motion must be ascribed to some other cause than an increase of density resultant on a lowering of its temperature, as the decrease of pressure in the one case and the increase of pressure in the other cannot be caused by differences of heating or cooling of the lower strata. Herr Hann is of opinion that both cyclone and anti-cyclone must be considered parts of the general circulation of the atmosphere.

***

A NEW ICE-STEAMER.—It is about ten years since the first ice-steamer was constructed at Gothenburg in Sweden, to force a path through the ice and so keep that port open throughout the year. In 1885, when the ice was a foot thick, this heavily built steamer broke and maintained a wide passage to the open sea. The ports of Christiania and Stockholm have since followed the example of Gothenburg. A recently constructed ice-breaking steamer has a spoon-like bill, which presses on the ice and crushes it in. The tanks of this boat, fore and aft, are connected by pumps, so that when any extra weight is required at the bow the pumps are set to work to transfer the water from the stern tanks to those in front of the vessel.

***

THE CONVERSION OF MECHANICAL POWER INTO LIGHT.—An interesting electrical experiment has recently been shown by Mr. E. C. Rimington to the Physical Society of London. Various observers have succeeded in producing a light in a vacuum tube without any electrodes by means of alternating currents of high potentiality and frequency. Mr. Rimington evokes such a light by simply revolving the tube in a constant electric field between two charged plates. He also produces the light by rotating the tube, and holding a glass or ebonite rod electrified by friction near it. Sufficient electricity is developed to make the rotating tube luminous at a distance of a foot from the rod if the rod is simply drawn once through a piece of dry flannel. The tube used in this experiment is a straight glass tube about five inches in length, with a bore similar to that of a spirit thermometer, and a bulb at each end. A T-piece allows it to be exhausted by an air pump and then sealed, besides forming an attachment to the motor which revolves it. The characteristic luminosity, which has a double fan shape, will appear on the tube being merely twirled between the finger and thumb near the excited rod.

***

SUBMERGED AIR.—Since the quantity of gas capable of being held in solution by a liquid increases in direct ratio with the pressure exerted, Mr. A. E. R. Richardson argues that water at the lower depths of seas and lakes must be highly charged with air. At a depth of 1,380 ft. water absorbs its own volume of air, measured at atmospheric pressure. Hence, in all water below this depth, he concludes we have a submerged atmosphere. J. R. G.

QUERY COLUMN.

ARITHMETIC.

E. DINGLE.—A man invests part of £2,445 in a five per cent. stock at 120, and the rest in another five per cent. stock at 125. His income from the two investments is £100. What sum did he invest in each stock? (Neglect brokerage.)

Income if all had been invested in first stock $= £2{,}445 \times 1\frac{5}{120}$
$= £\frac{2445}{24}$
$= £\frac{815}{8}$
$= £101\frac{7}{8}$;

Difference between this income and the income received
$= £101\frac{7}{8} - £100$
$= £1\frac{7}{8}$;

Difference between the incomes received on an investment of £1 in each of the stocks $= (1\frac{5}{120} - 1\frac{5}{125})£$
$= (\frac{1}{24} - \frac{1}{25})£$
$= £\frac{1}{600}$;

∴ Sum invested in second stock $= £(1\frac{7}{8} \div \frac{1}{600})$
$= £(15 \times 75)$
$= £1{,}125$

Sum invested in first stock $= £2{,}445 - £1{,}125$
$= £1{,}320.$ Ans.

WELL-KNOWN TEACHERS AT WORK.

MR. RICHARD GREENWOOD.

Stanley Street Board School, Deptford, S.E.

'To Deptford'! was the editor's suggestion. And forthwith I am ensconced in the 10.49 for New Cross. As the 'Mid-Kent crawler' wends its way, my thoughts are back in St. George's Hall, Liverpool, with Mr. Richard Greenwood in the chair for the second time—a well deserved tribute to twenty-one years of Union work. Every representative at the opening session of the Liverpool Conference last Easter must have felt that the Cornishman—for Mr. Greenwood hails from the uttermost parts of the earth—in dignity and epigrammatic eloquence, was the peer of the representatives of the Civic and Educational authorities who filled the platform. Nothing was more *apropos* than his description of the N. U. T. as an 'Art Union' endeavouring to restore the Art of Teaching.

The cry of the guard reminds me that this is 'New Cross,' and not the land of 'Dicky Sam,' and off I rush, on a bright June morning, to Stanley Street Board School. Several flights of stairs, and I find myself at the entrance to the Boys' Department. Ere I have scanned the plainly built interior of the Central Hall, the subject of my interview is on the scene, and with a merry tell-you-a-story twinkle in his eye, greets me with a cheery 'good morning.'

Twenty-one years ago Mr. Greenwood must have been a most advanced Unionist, for to-day he is almost the most 'forward' of his colleagues at Russell Square in the march to the goal of every true teacher—a rational system of education. Alert, vivacious, and pugnacious in right doing, our ex-President is as cautious and courteous as a president ought to be. Save for a sprinkling of nature's hoary embellishment, our subject is as youthful, and certainly as vigilant, sympathetic, and self-sacrificing, as the youngest of his colleagues. Following him to his room, I note the hardy, vigorous, and courageous Cornishman who formed one of the little band of pedagogues who, over a couple of decades ago, laid the foundations of the N. U. T.

> 'A merrier man,
> Within the limits of becoming mirth,
> I never spent an hour's talk withal."

He loves a story, and can tell a story quite as well as he can ask a question. Everybody who attended the Leeds Conference will remember 'Greenwood's story.' But on one occasion our friend was completely *nonplussed*. Addressing the students at the Boro' Road Training College, he, as usual, worked in a story which for some reason or other failed to raise a smile. After a pause he expressed his surprise by saying, 'Well, when you've seen the joke I'll go on.'

But my cogitations are cut short by our entrance into the master's room, remarkable chiefly for the absence of that gorgeous luxury provincials associate with a London Board School. Hardly have I passed the threshold ere my victim opens an interrogative fire, which draws from me the exclamation, 'This is not Russell Square.' At which a saddened smile passes o'er the Cornishman's face as he realises that for the nonce he must resign the work of interrogation to his visitor.

'Yes,' says Mr. Greenwood, 'this is a higher standard school, which, being interpreted, means that the cargo is increased without an addition to the crew. The school was built for 420, and our attendance this morning just equals our accommodation. The staff consists of six certificated assistant masters, one Ex. P. T., and two P. T.'s arranged thus :—

Standard I.	—30	4th year P. T.
,, II.B	—48	Crt. Ass. Mastr.
,, II.A	—56	,, ,,
,, III.B	—55	,, ,,
,, III.A	—33	Ex.P. T. Ass.
,, IV.	—79	Cert. Ass. Mastr.
,, V.	—62	,, ,,
,, VI.	—37	,, ,,
,, VII.	—20	
	420	

'In addition to the three R's, we take English in all classes, geography in the first four standards, and history above the fourth, as Class Subjects, with Algebra and Mechanics as Specifics, and Mathematics, Stage I., under the Science and Art Department. Last year we presented six in this subject at the May Examinations, and had two in the first class, and four in the second. We also take French.'

'I understand you have been very successful in passing your boys on to higher educational spheres by means of Scholarships.'

'That is one of the most pleasing features of my work,' says Mr. Greenwood. 'During my sixteen years' stay at Southwark Park Board School, the boys won nearly £2,000 in Scholarships. To attain this, special organisation is necessary, and my two years' work here has just culminated in a boy winning a Bancroft Scholarship of the value of £70 a year for four years.

Catching my glance round the room for the 'Honor Board' as we passed through the Central Hall a little later, Mr. Greenwood informs me that the Honor Board is 'on order.'

'May you repeat your Southwark experience and

TIME TABLE, 1892-3.—STANLEY STREET BOARD SCHOOL, DEPTFORD, S.E.

Standard.	9—9.5.	9.5—5.10.	9.40—10.	10—10.40.	10.40—10.45.	10.45—11.25.	11.25—12.	12.	12—12.30
VII.	Prayers and Hymn	Scripture.	Registers closed.	Drill	Recreation.	Algebra	Grammar	Dismissal.	Detention, if necessary, for disciplinary purposes.
VI.				Drill		Algebra	Grammar		
V.				Arithmetic		Grammar	Compn. or Dictn.		
IV.				Arithmetic		Repetition	Dictation		
III.				Arithmetic		Reading	Dictation		
II.				Arithmetic		Reading	Dictation		
I.				Arithmetic		Rdg. or Grammar	Copy Books		
VII.				Arithmetic (Mental)		Compn. or C. Bks.	Mechanics		
VI.				Arithmetic		Compn. or C. Bks.	Mechanics		
V.				Arithmetic		Mechanics	Compn. or C. Bks.		
IV.				Arithmetic		Reading	C. Bks. or Wtg.		
III.				Arithmetic		Reading	Dictation		
II.				Arithmetic		Reading	Dictation		
I.				Arithmetic		Reading	Dictation		
VII.			Miscellaneous.	Arithmetic		Grammar	Music		
VI.				Arithmetic		Grammar	Music		
V.				Arithmetic (Mental)		Grammar	Composition		
IV.				Arithmetic		Reading	Dictation		
III.				Arithmetic		Rdg. or Spelling	Copy Books		
II.				Arithmetic		Grammar	Dictation		
I.				Arithmetic		Reading	Copy Books		
VII.			Registers closed.	Arith. or Euclid		French	Plane Geom. Dg.		
VI.				Arithmetic		Grammar	Drawing		
V.				Arithmetic		Mechanics	Drawing		
IV.				Arithmetic		Geography	Dictation		
III.				Arithmetic		Grammar	Dictation		
II.				Arithmetic		Reptn. or Spg.	Drawing		
I.				Arithmetic (Mental)		Reptn. or Spg.	Drawing		
VII.				Arithmetic		Reading	Algebra		
VI.				Arithmetic		Reading	Algebra or Arith.		
V.				Arithmetic		Reading	Dictation		
IV.				Arithmetic		Reading	Dictation		
III.				Arithmetic		Repetition	Dictation		
II.				Arithmetic		Reading	Copy Books		
I.				Arithmetic		Reading	Dictation		

Day.	2—2.15.	2.15—2.55.	2.55—3.40.	3.40—4.25.	4.25—4.30.	4.30.	4.30—5.
Monday.	Registration and Miscellaneous.	Solid Geom. Dg.	Reading	Freehand	Prayers.	Dismissal.	Detention, if necessary, for disciplinary purposes.
		Freehand	Reading	Solid Geom. Dg.			
		Drawing	Repetition	Drawing			
		Grammar	Drill	Spelling			
		Grammar	Drawing	Reading			
		Grammar	Drawing	Reading			
		Reading	Drawing	Reading			
Tuesday.		History	Arith. or Euclid	Reading			
		History	Arithmetic	Reading			
		History	Arithmetic	Reading			
		Arithmetic (Mental)	Geography	Drawing			
		Arithmetic	Drill	Geography			
		Arithmetic	Geography	Dictation			
		Arithmetic	Object or Rdg.	Transcription			
Wednesday.		History	Arith. or Euclid	Reading			
		History	Arithmetic	Reading			
		Reading	Drill	Music			
		Drawing	Object or Gram.	Dictation			
		Dictation	Arith. or Compn.	Drawing			
		Drawing	Rdg. and Spg.	Music			
		Drawing	Reading	Music			
Thursday.		Algebra	Mechanics	Composition			
		Algebra	Mechanics	Composition			
		History	Arithmetic	Reading			
		Arithmetic	Grammar	Dictn. or Wtg.			
		Arithmetic	Music	Reading			
		Arithmetic	Drill	Object or Rdg.			
		Arithmetic	Reading	Dictation			
Friday.		Composition	Repetition	Dictation			
		Composition	Repetition	Dictation			
		Grammar	Composition	Reading			
		Reading	Drawing	Music			
		Geography	Drawing	Reading			
		Geography	Dictation	Reading			
		Geography	Drill	Reading			

fill the first, and once more have a second on order,' is my reply. 'But you organise the school with a view to these competitions, I understand?'

'Quite true. To some extent I ignore the Code below the fourth standard. I find that the opportunity of the sharp boy generally comes in the second standard, so I arrange the work of the second standard so as to make it possible to promote a boy directly to the fourth.'

'Do you think the new course in arithmetic will do much to meet schools like yours?'

But, ere my query is ended, a visitor with an ominous black bag appears. Visions of inspectorial surprises are soon dispelled on my introduction to the most welcome of visitors—the pay clerk; and for the next five minutes I am 'steeped to the lips in misery' as the dollars are doled out to all save the interviewer. Every member of the staff walks in in turn (the master taking charge of the class), grips 'the friend in need' by the hand, signs the sheet, pockets the glistening gold or the crisp bank notes, hesitates, and queries—

'Not paying the Superannuation to-day?'

'No,' replies the genial pay clerk, with a smile, 'but I think you are certain to get it before the holidays.'

And ere I have time to grasp the history bound up in the question and answer, the visitor is *non est.*

The disappearance of the man with the money-bag is followed by the re-appearance of the veteran Unionist.

My remarks as to the expeditious method of payment elicits the fact that the suggested alteration in the mode of payment will bear hardly on many teachers who live a mile or two from the nearest branch of the Board's bankers, especially the weaker sex.

'Let me see,' says Mr. Greenwood, 'you suggested something about Course B in the New Code. I have not looked at it very minutely, because, our examination being due in February, we cannot take it this year. So far as I can see the new scheme is educational, since it deals fully with the principles, and gives elasticity. In the lower standards the large amount of oral work will be very trying to the teacher, and I am not sure that the first standard is not unduly loaded.'

As the time is rapidly flying, Mr. Greenwood suggests a visit to the class rooms.

Passing through the central hall, I notice a list posted on the wall. It contains the classes, arranged in order of merit for regularity and punctuality, and I am informed that the class which attains a perfect attendance for a week is allowed a reward in the shape of a little earlier dismissal on Friday afternoon.

'Woe betide the hapless youngster through whose negligence the coveted honour is lost. I have known,' says our guide, 'half-a-dozen class-mates call for the sluggard to ensure his early attendance.'

Ushering me into a class room where I find the fifth standard at work under Mr. Binns, I note the pride with which the boys scan my face as I glance at a card, prominently hung, with the following words boldly printed thereon:—

'This class was the most punctual in the school last week.'

R. Greenwood

Hanging round the room are home-made charts—the evidence of a practical and interested class teacher. Here grammar charts, there drawing copies worked on a sheet of cardboard glazed to take chalk like a blackboard, and everywhere class lists, whereon I read the ten best boys, or the three boys who missed the mark for punctuality last week.

'Of course, this system of marks entails a lot of work,' I suggest to the teacher.

'Very little,' replies the assistant master, 'and the result more than repays.'

'How do you keep the record?'

'Every boy is his own mark-keeper for a couple of days, when the totals are entered. To prevent deception, every boy must hold himself ready to prove his entries to his neighbour,' says the teacher.

The sixth and seventh standards are busily at work—the latter at Algebra.

As I enter the class wherein the 80 boys of the fourth standard are housed, I am struck with the evidence of the ingenuity of the teacher, Mr. Shovélier. The walls are covered with charts and diagrams, even of French vocabulary. In reply to my query, the teacher informs me that writing is the most difficult subject to teach, through the eccentricities of English etymology.

But we hurry on to the third standard, when we find the card for regularity blazons forth the fact that this class was the most regular last week.

In the second standard I find a well-tried and old favourite—'Darnell's Arithmetic Made Easy.'

'Yes,' says Mr. Greenwood, 'I have implicit faith

in "Darnell's Arithmetic"—no better book has yet come under my notice.'

In the same room is the first standard. The first standard ought to be in the Infants' Department, but these children are too old to mix with infants, and have succeeded in remaining outside the purview of the board and easel long enough to be too ignorant for the second standard.

'What about classification?'

'As we went round the classes you noticed the boys promoted.'

'Quite true, and I noticed that these children soon made their way to the top of the class after promotion. I believe that is generally true, but what about those you put down?'

'You have seen the boys who have been promoted, for I believe that proper classification means promotion as well as demotion. Of course these are children who cannot keep pace, some from mental dulness, but others from irregularity. I advise the parents of the consequences. Here is a copy of my circular:

"STANLEY ST. SCHOOL,
'DEPTFORD, S.E.,
....., 189

"DEAR MADAM,—Allow me to call your attention to an important change lately made by Parliament in regard to the teaching in Board and other Elementary Schools.

"The class in which a child is taught no longer depends on the results of the Government Examination, but for the future each child is to be taught in the class for which his *attainments* most fit him.

"As irregularity of attendance is the greatest stumbling-block to progress, it is not only possible, but probable, that unless your son . . . . . attend school *regularly*, he will have to remain in the same class for two years instead of one.

"This will be so detrimental to his future welfare, that I trust you will do your best for him now, by sending him to school *ten times a week*, so that when he is older he may not be left behind in the race for a livelihood.

"I am, dear Madam,
"Yours truly,
"R. GREENWOOD."

'Do you find any evils resulting from the free use of your powers?'

'The greatest evil lies in the total exemption on passing the sixth standard. Occasionally I find my promotion frees the boy from school earlier than otherwise. I hope the London School Board will imitate the Bolton School Board, and raise the exemption standard to the seventh. I don't think London ought to be behind Bolton.'

'I understand that the Executive of the N.U.T. have a scheme for solving some of the difficulties?'

'Yes, I believe the adoption of our suggestions for an "Age and Attendance" qualification in lieu of "Age and Standard," would do much to remove difficulties from the teacher's path. I don't think the educational aspect of an attendance qualification has received sufficient attention from teachers.'

'Do your children stay on after reaching 13 years of age?'

'Not in any appreciable proportion. Unfortunately the general rule is to leave school at thirteen if possible.'

'Yes, I have a pretty good lot of boys, although some hail from very poor homes, as you will have noticed as you passed through the school. I endeavour to keep the parents interested in the work of the child, and if the scholar is irregular, or the parent indifferent, I drop a line. Here is one of my notes:—

"STANLEY ST. SCHOOL.
"DEAR MADAM,—Last year the education of each boy in this school cost sixteen pence per week.

"I presume few of us will be able to leave fortunes to our children, but we can obtain for them now that which will be worth more to them than gold, viz., good elementary education.

I trust you will do your best to secure for your son as much of this good as possible, but he is not so regular in his attendance as I think he might easily be.

"Regularity of attendance on his part is of no benefit to the teachers here, and it is solely in your son's behalf that I appeal to you to give this subject your serious and careful consideration.

"When he is absent with your consent, will you please kindly send me a line.

"Yours very truly,
"R. GREENWOOD.

"P.S.—This week he has been absent times."

'This is writ "Sarkastic," I suggest.'

'Not at all,' says Mr. Greenwood as he laughingly adds, 'you see I include myself among those who will not be able to leave fortunes to our children.'

'When I fail to rouse the parent to a true sense of responsibility by letter, classification comes in. Certainly, I would not put down a boy because he was irregular, but irregularity generally results in failure to keep pace with the class. The most difficult cases to deal with are the very sharp children who attend irregularly, and, in spite of irregularity, keep pace with the rest, and somewhat vitiate my power.'

'What do you think of intermittent inspection?'

'I am glad to see that Mr. Acland has swept the Annual Show Day from the Evening Schools, although I regret he has not abolished variable grants as the natural corollary to the first reform. Not being engaged in Evening School work, I cannot

speak from experience, but I should imagine that in no part of our educational system has the annual examination had a more stifling effect than in the Evening Schools.'

'Am I to understand that you would be prepared to accept the intermittent inspection of the New Evening School Code?'

'Yes, as a first instalment I would accept that, although I am not without hope that the N. U. T. will be able to convince Mr. Acland of the anomaly of a variable grant under the new conditions of examinations. So unreal, uneducational, and demoralising is the fixed Annual Parade, that any form of intermittent inspection would be an improvement, I feel sure.'

'What about the Board's Superannuation Scheme? I noticed you did not inquire as to the date of repayment.'

'The scheme was, and is, a very good speculation for me, so I remained in. I objected to the compulsory character of the scheme originally, but now that the Board have given present teachers the chance of withdrawal my objection vanishes. So long as the scheme was compulsory, I felt that my superannuation would come out of the younger teachers, more especially the ladies. To this I objected as much as any one.'

'Now, can you tell me anything about the working of your school?'

'Certainly,' says Mr. Greenwood; 'I have a time-table here which maps out my lessons to the various classes. This morning I should have been in with the seventh standard taking Algebra but for your visit. You will see from this time-table I am down for grammar, standard seven; arithmetic, Euclid, and geometrical drawing on other occasions, and I give the teacher of standard four help as often as possible. The advantages of a Master's Time-Table are that the teacher knows when I am coming to help. I also take the P. T.'s class when he is at the P. T. centre, and every class gets some portion of my time.'

Mr. Greenwood's motto is, 'A little at a time, but that little well.' He believes in testing every rule as he goes along, and humorously displays test cards in proportion from the columns of our contemporary, 'The Teachers' Aid,' mounted.

'You must have some system of examination to keep so large a school working in such admirable order and steady industry?'

'We have a system very much on the lines of my idea of intermittent inspection. In the first place the teacher maps out his work into a number of periods. When I go to the class I know at what stage of the programme the class ought to be. I examine on the work done. In arithmetic I find the "All the Year Round Tests" very useful. A register is kept to record the individual results, and in a similar book a detailed criticism of the work, together with a copy of tests set in each subject. By this means the work of one year is compared with that of preceding years. The record also shows how far the work of correction has been carried out. Occasionally I give a standard the tests of the standard below. At my last examination I gave standard five the third standard problem test cards.'

'I should think you would be able to secure yourself against an inspector's caprice with such admirable data as that contained in your two books?'

'Certainly; but I should be able to add the actual papers worked during the year, for I preserve them as a safeguard,' says Mr. Greenwood.

'I anticipate you don't administer much corporal punishment?'

'It would be considerably reduced if the regulation prohibiting assistants from administering corporal punishment were withdrawn. All my certificated assistants are married men, and why they should not be entrusted with the power, I cannot conceive. The regulations are so illogical that their repeal is certain, and I hope close at hand.'

'I see from your time-table that from 9.40 to 10, and from 2 to 2.15 you have no fixed lessons.'

'Quite true; the arrangement is intentional, so as to give the teacher the opportunity of taking his favourite subject, or the subject requiring most attention. The arrangement works well, because it avoids spasmodic suspensions of the time-table. You will also see that the time-table provides for retention till 12.30 and 5 *if necessary* for disciplinary purposes.'

'This is a centre, I believe, for drawing, &c.'

'The next floor above is used as a centre, and drawing and clay modelling are taught. I dare say you noticed, as you came in, that a new building was being erected. That is to be used for manual instruction and laundry work. We also have a cookery centre here.'

'And now as to your long and honourable connection with the N. U. T.?'

'My first connection with the N. U. T. dates back so far as 1871, and in 1873 I became a member of the executive, by virtue of my office as secretary of the Southwark Association. I am a member of the committee of both the Benevolent and Orphan Funds, being a trustee of the former. I was chairman of the committee which drew up the rules for the Benevolent, Orphan, and Provident Funds. I have been Treasurer, Vice-president, and President; and last year my colleagues did me the honour of electing me Deputy President on Mr. Yoxall's appointment as Secretary; and, therefore, I am now ex-President.'

'Need I remind you, Mr. Greenwood, how much teachers feel is due to the sturdy pilots who steered the Union through troubled waters?'

'Well, I, for one, am proud of the growing strength of our Union; and I feel now, that after having given nearly all the leisure of 21 years of the best period of my life to the work, I could retire without being charged with want of interest in education as a public question,' says Mr. Greenwood.

No, friend Greenwood; it may be unreasonable, but we are reserving your seat at Russell Square for many years to come. It is not always that twenty-one years' experience is accompanied by so slight a trace of age.

'I understand you are a Freemason?'

'I am secretary and founder of a lodge for Cornishmen in London.'

And I further learn that Mr. Greenwood is as fond of cricket and tennis as he was twenty years ago, and takes a turn with the willow, or serves a 'breakback' after school on every available opportunity. Mr. Greenwood was trained at Exeter, and for twelve years was master of Kilkhampton National School, a Cornish mixed school with an average attendance of 90. From the rural school to St.

Saviour's Parochial School, S.E., was his next move. And two years later he commenced his sixteen years' service at Southwark Park Board School. 'I don't mind telling you,' says Mr. Greenwood, 'that my salary is less now than it was 15 years ago.'

And just as we are wondering what is the offence for which he has been reduced, Mr. Greenwood, with a merry twinkle, says: 'Oh, that's due to my promotion. It's a way they have, under the Board, of promoting and reducing the salary.'

Notwithstanding the many calls on his leisure, Mr. Greenwood finds time to visit that sacrificing friend of teachers—Thomas Edmund Heller—who in this time of harvest is not forgotten by his colleagues of the seed time.

As Mr. Greenwood shows us through the playground, where the youngsters are busy at 'cricket,' with wickets chalked on the walls, we learn that he rarely visits the 'nets' without coming across some old boy who was taught how to play 'forward' or 'late' by the versatile master of the Stanley Street Board School.

Thanking our host for the courtesy extended, and wishing him a continuance of pedagogic and public success, we bid adieu to the school and its enthusiastic head.

THE 1893 SCHOLARSHIP EXAMINATION.

BY DR. GEORGE BEACH, M.A.

Co-Author of 'A Manual of our Mother Tongue,' 'A Girls' Arithmetic.' Author of 'Elements of English,' 'Entertaining Readers,' etc.

I. ANALYSIS OF QUESTIONS DURING LAST TWELVE YEARS :—

(*a*) *Domestic Economy* has already been inserted.
(*b*) *English* ,, ,, ,,
(*c*) *Geography* ,, ,, ,,
(*d*) *History* ,, ,, ,,
(*e*) *School-Management* ,, ,, ,,
(*f*) *Euclid* ,, ,, ,,
(*g*) *Needlework* ,, ,, ,,
(*h*) ALGEBRA (*with typical examples*).

i. *Addition. None.*

ii. *Subtraction*, 1882. $(x+y)(3a-2b)$ from $(x+y)(3a+2b)$.
Ans. $4b(x+y)$.

iii. *Multiplication*, 1882. Express algebraically :— The fourth power of the sum of two numbers, together with twice the product of their squares, is equal to the sum of their fourth powers, together with four times the product of their product, and the square of their sum.

1881. $(1-x^2+x^4-x^6)(1+x^2)$. Ans. $1-x^8$.

1892. Show that the product of any four consecutive numbers increased by *one* is a perfect square.

1887. Prove that $(1+x)(1+y)-xy(1-x)(1-y)$ contains $1+xy$ as a factor. Find the other factor.
Ans. $1+x+y-xy$.

1888. Determine c and d so that in the product of x^2+x+1 and $x^2+cx+dx+e$, the co-efficients of x^4 and x^3 may vanish. Ans. $c=-1$ and $d=0$.

iv. *Division*, 1889. Divide $2x^4+12x^3+26x^2+24x+8$ by x^2+3x+2. Ans. $2(x^2+3x+2)$.

1882. Prove that the difference between the cube of the sum of any two numbers, and the sum of their cubes is divisible by three times their product.

1887. Divide $\frac{1}{2}a^3+\frac{3}{2}a^2x-2x^3$ by $\frac{1}{2}a+x$.
Ans. $a^2+ax-2x^2$.

1884. ,, $7x^2-\frac{1}{7}$ by $x+\frac{1}{7}$. Ans. $7x-1$.

1881. What is the condition that x^2+px+q may be divided by $x-r$?
Ans. $r=\frac{-p\pm\sqrt{p^2-4q}}{2}$.

v. *Factors.* Break into factors (1889) $21x^2-40x-21$.
Ans. $(7x+3)(3x-7)$.

,, ,, $143x^2+8x-16$.
Ans. $(13x-4)(11x+4)$.

,, ,, x^3-2x^2+2x-1.
Ans. $(x-1)(x^2-x+1)$.

1884. ,, ,, $x^2+3x-10$.
Ans. $(x+5)(x-2)$.

,, ,, $9x^2+15x-14$.
Ans. $(3x+7)(3x-2)$.

1883. ,, ,, (x^4-1).
Ans. $(x^2+1)(x+1)(x-1)$.

,, ,, x^2-x-12.
Ans. $(x+3)(x-4)$.

1885. ,, ,, x^8-y^8.
Ans. $(x^4+y^4)(x^2+y^2)(x+y)(x-y)$.

,, ,, x^3-3x^2+3x-1.
Ans. $(x-1)(x^2-2x+1)$.

,, ,, $x^2+8x-105$.
Ans. $(x+15)(x-7)$.

vi. *Greatest Common Measure.*

1891. Find G.C.M. of x^3-3x^2+4x-2 and x^3+2x^2-4x+1.
Ans. $x-1$.

1890. ,, ,, $6x^3-17x^2+22x-15$ and $8x^3-22x^2+27x-18$.
Ans. $2x-3$.

1883. ,, ,, $x^3-3x^2-13x+15$ and $x^3+9x^2+11x-21$.
Ans. x^2+2x-3.

1892. ,, ,, $7x^4-10x^3+3x^2-4x+4$ and $8x^4-13x^3+5x^2-3x+3$.
Ans. $x-1$.

1887. ,, ,, $x^3y+2x^2y^2+2xy^3+y^4$ and $5x^5+10x^4y+5x^3y^2$.
Ans. $x+y$.

1881. ,, ,, $x^4+7x^3+6x^2-32x-32$ and $x^2+9x+20$.
Ans. $x+4$.

1889. ,, ,, $6x^3-10x^2+10x-4$ and $9x^3+3x^2+3x-6$.
Ans. $3x-2$.

1888. ,, ,, and L.C.M. of $\begin{cases} 6a^3-5a^2x-6ax^2; \\ 12a^2x^2+9ax^3 \text{ and } 6a^2x-13ax^2+6x^3. \end{cases}$

Answers. $\begin{cases} 2a-3x. \\ ax(2a-3x)^2(3a+2x)(3a-2x). \end{cases}$

1885. Reduce to lowest terms $\frac{x-8x^2+15x^3}{x-x^2-20x^3}$.
Ans. $-\frac{3x-1}{4x+1}$.

,, ,, $\frac{(a+b+c)^2+(a-b)^2+(b-c)^2+(c-a)^2}{a^2+b^2+c^2}$.
Ans. 3.

1886. ,, ,, $\frac{39(x^4-4x^3+4x^2-1)}{65(x^4+4x^2-4x-1)}$
Ans. $\frac{3(x^3-3x^2+x+1)}{5(x^3+x^2+5x+1)}$.

vii. *Fractions*—

1886. Simplify $\left(\frac{2x-y}{x+2y}-\frac{x-2y}{2x+y}\right)\div\frac{x^2+y^2}{x^2+2xy}$
Ans. $\frac{3x}{2x+y}$.

1888. ,, $\frac{3x-4y}{4x+5y}-\frac{4x-5y}{5x+6y}+\frac{1}{20}$
Ans. $\frac{y(4x+50y)}{(4x+5y)(5x+6y)20}$.

1889. Simplify $\frac{x^3+2}{(x-2)^2(x^2+1)} - \frac{4}{5(x-2)} - \frac{x+2}{5(x^2+1)}$.
Ans. $\frac{x^3+2}{(x-2)^2(x^2+1)}$.

1887. ,, $\frac{1}{x-1} - \frac{1}{2(x+1)} - \frac{x-3}{2(x^2+1)}$
Ans. $\frac{x(3x+1)}{(x^2+1)(x^2-1)}$.

1882. ,, $\left(x+2+\frac{4}{x-2}\right) \div \left(\frac{x^3}{x^2-4} - x\right)$
Ans. $\frac{x(x+2)}{4}$.

1892. ,, $\frac{\frac{x}{y} - 1 + \frac{y}{x}}{\frac{x}{y} + 1 + \frac{y}{x}} \times \frac{\left(\frac{x}{y}\right)^3 - 1}{\left(\frac{y}{x}\right)^3 + 1} \times \frac{y^2+xy}{x^2-xy}$.
Ans. $\frac{x^2}{y^2}$.

1890. ,, $\frac{1}{x-y} - \frac{2x}{x^2-y^2} - \frac{2x^2}{x^3-y^3}$
Ans. $\frac{y^3-3x^2y-4x^3}{(x-y)(x+y)(x^2+xy+y^2)}$.

1891. ,, $\left(a+\frac{b^2}{a}-\frac{a-b}{a-\frac{b^2}{a}}\right) \div \frac{1-\frac{a}{b}}{1-\frac{a^2}{b^2}}$ Ans. $\frac{b}{a}$.

viii. *Substitutions.*

1884. Find the value of $\frac{x^2+y^2}{x^2-y^2}$ when $x = \frac{a+b}{a-b}$ and $y = \frac{a-b}{a+b}$.
Ans. $\frac{a^4+12a^2b+b^4}{8ab(a^2+b^2)}$.

1881. Find the value of $\sqrt{a^2b^3} + \sqrt[3]{a^3b^3} + \sqrt[6]{a^2b^2}$ when $a = 5$, $b = 25$. Ans. 755.

1885. Find the value of $(a+b)^2 + (b+c)^2 + (c+a)^2$ when $a = -1$, $b = -2$, $c = 3$. Ans. 14.

1886. Find the value of $\frac{7x^2-10xy+3y^2}{7x^2+10xy+3y^2} - \frac{20y}{33x}$ when $x = 5$, $y = 3$. Ans. $-\frac{19}{88}$

ix. *Simple Equations.*

1890. $\frac{3x-8}{25} + \frac{4x-9}{35} = \frac{5x-27}{14}$. Ans. $x = 11$.

1883. $\frac{x-3}{5} + \frac{x-7}{3} = \frac{x-9}{7} + 9$. Ans. $x = 27\frac{9}{41}$.

1882. $-17\left(x - \frac{4-x}{3}\right) = 12\left(5x - \frac{7+3x}{8}\right)$.
Ans. $x = \frac{229}{401}$.

1884. $\frac{5x-9}{8} + \frac{7x-1}{10} = \frac{11x+7}{15} + 6$.
Ans. $x = 13$.

1887. $\frac{3x-1}{7} + \frac{6-x}{4} - \frac{2x-4}{12} = 2 - \frac{x+2}{28}$.
Ans. $x = 5$.

1889. $\frac{x+10}{5} - 4\frac{3}{4} - \frac{x}{4} = \frac{x-2}{3} - (x-1)$.
Ans. $x = 5$.

1885. $\frac{2x+7}{26} - \frac{x-8}{39} + \frac{x}{13} = 1\frac{1}{2}$. Ans. $x = 8$.

1881. $16 - 4x + 8x = 5x + 14$. Ans. $x = 2$.

1885. $\frac{2x+7}{5} - \frac{25-x}{2} = \frac{7x-5}{32} + 2$. Ans. $x = 19$.

1886. $\frac{5x-13}{21} - \frac{5(3+x)}{14} = -4 - \frac{5-x}{6}$
Ans. $x = 11$.

1891. $\frac{9}{x+1} - \frac{3(x-1)}{x-2} + \frac{3x}{x+2} = 0$. Ans. $x = -10$.

x. *Simultaneous Equations.*

1891. $x + \frac{y}{11} = 71$; $y - \frac{x}{13} = 61$.
Ans. $x = 65$, $y = 66$.

1886. $\frac{3x-2y}{7} + \frac{2x-3y}{5} = \frac{14}{5}$; $31y - 30x + 111 = 0$.
Ans. $x = 13$; $y = 9$.

1885. $\frac{2}{x} + \frac{3}{y} = 31$; $\frac{5}{y} - \frac{7}{x} = 31$.
Ans. $x = \frac{8}{93}$; $y = \frac{12}{31}$.

1881. $8x - 4y = 5$; $\frac{9x}{2} = y + 5$. Ans. $x = 1\frac{1}{2}$; $y = 1\frac{3}{4}$.

1888. $\frac{11x}{9} = y - 2$; $\frac{x}{3} - \frac{y}{13} = 2$.
Ans. $x = 9$; $y = 13$.

1889. $\frac{3x+1}{7} - \frac{2x-y}{2} = \frac{2y-x}{8}$; $\frac{4x-2}{3} - \frac{4y-5x}{2} = \frac{x+y}{5}$.
Ans. $x = 2$; $y = 3$.

1887. $\frac{x+3y}{4} + \frac{3x+y}{12} = 11$; $x + y = 8(y-x)$.
Ans. $x = 7$; $y = 9$.

1884. $\frac{3x+2}{5} = \frac{5y-11}{4} + 1$; $\frac{3x}{2} + \frac{5y}{4} = 25\frac{1}{4}$.
Ans. $x = 11$; $y = 7$.

1882. $32x + 81y = 45$; $28x - 39y = 369$.
Ans. $x = 9$; $y = -3$.

1883. $\frac{x}{3} + \frac{y}{8} = 41$; $4y - 3x = 0$. Ans. $x = 96$; $y = 72$.

1892. $4y + \frac{65}{x} + 23 = 0$; $3y - \frac{78}{5x} + 22\frac{1}{2} = 0$.
Ans. $x = 13$; $y = -7$.

1890. $\frac{2y-25}{3} - \frac{6-x}{7} = \frac{2(y-7)}{5}$;
$\frac{29-x}{8} - \frac{3y-1}{10} = \frac{4-x}{3}$. Ans. $x = 13$; $y = 17$.

xi. *Quadratics.*

1890. $\frac{13}{2x-1} - \frac{10}{3x-1} = \frac{1}{2}$. Ans. $x = \frac{1}{6}$ or 7.

1892. $\frac{2x-3}{3x-2} + \frac{2}{3} = \frac{3x-2}{2x-5}$. Ans. $x = 1$ or $-17\frac{2}{3}$.

1883. $\frac{x-12}{x-5} + \frac{x-5}{x-12} = 2\frac{4}{35}$. Ans. $x = 29$ or -12.

1882. $\frac{3x}{x+2} - \frac{x-1}{6} = x - 9$. Ans. $x = 10$ or $-1\frac{1}{2}$.

1884. $2x + \sqrt{x^2+7x+23} - 25 = 0$. Ans. $x = 28\frac{2}{3}$ or 7.

1887. $\frac{2x-3}{x-2} - \frac{1}{6} + \frac{2x-1}{1-x} = 0$. Ans. $x = 4$ or -1.

1889. $\frac{1}{9-2x} + \frac{4}{5} = \frac{1}{3-x}$. Ans. $x = 4\frac{7}{8}$ or 2.

1888. $\frac{3x}{x-2} + \frac{x-1}{x-5} = 8$. Ans. $x = 6\frac{1}{2}$ or 3.

1881. $\sqrt{x^2+16x+7} = 3x - 5$. Ans. $x = 9$ or 2.

1885. $\frac{2x}{51-2x} + \frac{68-3x}{x} = 3$. Ans. $x = 17$ or $14\frac{4}{5}$.

1886. $\frac{23}{x+4} - \frac{x+5}{3} + \frac{3x}{11} = 0$. Ans. $x = 7$ or $-38\frac{1}{2}$.

1891. $x - \frac{5}{2} + \frac{1}{x-\frac{5}{2}} = x - 1 + \frac{1}{x-1}$.
Ans. $x = 3$ or $\frac{1}{2}$.

xii. *Problems.*

(*a*) 1891. A farmer holds two farms, for each of which he pays a rent of 32*s.* an acre, the total rent being £432. The value of the land falling, the rent of the smaller farm was reduced 2*s.*, and of the other 7*s.* per acre, and his total rent was

reduced by £64 10s. Find the number of acres in each farm. (Simple equation, one unknown.)
Ans. 150 acres and 120 acres.

1891. A tradesman started in business with a capital of £1,200, and in the first year he makes a certain percentage of profits, from which he takes £164 and adds the rest to his capital. In the next year he makes the same percentage of capital, and having again withdrawn £164, finds that he has £1,422 left in the business. What percentage of profit did he make? (Quadratic.) Ans. 22 per cent.

1886. A and B have two guineas between them; and if A give to B one shilling for every penny B had, A will then have 10s. less than B. How much had each at first? (Simple equation, one unknown.) Ans. A had £2, B had 2s.

1885. A train 200 yards long passes another train 240 yards long, moving in opposite directions on parallel lines, in 12 seconds. If they had been moving in the same direction, they would have cleared each other in one minute. Find the rate per hour of each of the trains? (Simple equation, two unknowns.) Ans. 30 miles, 45 miles per hour.

1888. The accounts of a school showed a debt which was paid off by three managers—A, B, and C. A paid half the debt and £2 more, B paid half the remainder and £7 more, C paid half of what remained and £8 more, which just cleared off the debt. What did each pay? (Simple arithmetic, or equation with one unknown.) Ans. £50, £30, £16.

1889. In a factory there are 62 workmen, and the total amount of their weekly wages is £74 6s. A certain number of them receive 40s. a week, twice as many receive 29s. 6d. a week, and the rest 17s. a week. Find the number receiving each rate of wages? (Simple equation, one unknown.)
Ans. 9, 18, 35.

1887. A grocer bought 2 cwt. of sugar at £1 5s. per cwt. The sugar having been damaged, he sold part of it at 2d. per lb., and the rest at 2½d., and on the whole transaction lost 12½ per cent. How much did he sell at each price? (Simple equation, one unknown.)
Ans. 70 lbs. at 2d.; 154 lbs. at 2½d.

1884. An avenue is planted with trees 20 feet apart. If the trees had been planted 15 feet apart, the cost would have been increased by £5 at 2s. per tree. Find the length of the avenue? (Simple equation, one unknown.)
Ans. 3,000 feet.

1883. A purse contains only threepenny and fourpenny pieces, equal in value to £2 10s. 7d. If the number of threepenny and fourpenny pieces were interchanged, the value would be £2 8s. 7d. Find the number of coins of each sort? (Simple equation, one unknown.)
Ans. 97 fourpenny, 73 threepenny.

1892. Two trains go from P to Q by different routes, one of which is 15 miles longer than the other. A train on the shorter route takes 6 hours, whilst a train on the longer route, travelling 10 miles less per hour, takes 8½ hours. Find the length of each route? (Simple equation, one unknown.)
Ans. 240 miles and 255 miles.

1890. One hundred and ninety-four sticks (some of which are each a yard long, and the rest are each a foot long) are placed in contact along a straight line, and measure a distance of half a furlong. How many were there of each? (Simple equation, one unknown.)
Ans. 68 a yard long, 126 a foot long.

1890. Find two numbers whose sum is 22, and the sum of their squares 250. (Quadratic equation, one unknown.)
Ans. 9 or 13.

1883. Form the equation whose roots are 3 and −3.
Ans. $x^2 - 9 = 0$.

1883 If $x^2 + ax + 576$ is a perfect square, what is the value of a?
Ans. 48.

xiii. *Proofs.*

1891, 1888, 1889, 1882. Prove that $\frac{a}{b} \div \frac{c}{d} = \frac{ad}{bc}$ where the letters denote any number.

1890. Prove the rule for finding the G.C.M. of two algebraic expressions.

1889. Prove that if c be a common measure of a and b, it will also measure $ma + nb$.

1888, 1892. Show that the L.C.M. of two algebraical expressions is their product divided by their G.C.M.

1892, 1884. If p and q be the roots of the equation $x^2 - ax + b = 0$, prove that $p + q = a$, and $pq = b$.

The Candidate should also be prepared to show that:—

(*a*) No quadratic can have more than two roots.

(*b*) H.C.F. is a more correct algebraical expression than G.C.M.

II. Notes on Euclid.

Signs and contractions.

(*a*) *Allowed by Department.*

=	means	*equal to*, or *equals*
>	,,	*angle*
rt.>	,,	*right angle*
∠ABC	,,	*angle ABC*
	,,	*angle ABC*
⊥	,,	*perpendicular*
△	,,	*triangle*
rt. >d. △	,,	*right-angled triangle*
Equil. △	,,	*equilateral triangle*
Isos. △	,,	*isosceles triangle*
str.	,,	*straight*
∥	,,	*parallel*, or. *parallel to*
	,,	*parallelogram*
sq.	,,	*square*
rect.	,,	*rectangle*
⊙	,,	*circle*
circu. of ⊙	,,	*circumference of circle*
∴	,,	*therefore*
∵	,,	*because*

(*b*) *Not allowed by Department.*

>	means	*greater than*
<	,,	*less than*
	,,	*not greater than*
	,,	*not less than*
AB^2	,,	*sq. on AB*
AB.BC	,,	*rect. contained by AB and BC*
AB + BC	,,	*sum of AB and BC*
AB − BC	,,	*difference of AB and BC*
AB × BC	,,	*product of AB and BC*
AB ÷ BC	,,	*quotient of AB divided by BC*
$\frac{AB}{BC}$	,,	*quotient of AB divided by BC*

The RULE is that ANY *descriptive* abbreviations of TERMS may be used, but not *ambiguous* ones (*e.g.*, < = *less than*), nor may signs of arithmetical OPERATIONS be employed.

Neither figures, manuscript capitals, nor the leading letters of the alphabet may be applied to the diagrams, but such characters as M, N, O, P, Q, R, etc.

Converse of Propositions.—There is no converse to Problems, but every Theorem has at least *one* converse, and sometimes *many*. When the whole or a part of the conclusion of *Proposition A* forms the hypothesis of a kindred Proposition B, whilst the whole or a part of the hypothesis of *A* forms the conclusion of B, then A and B are converse propositions.

Proposition A (*Euclid* I. 5)—
The Hypothesis is 'Two sides of a triangle are equal.'
The Conclusion is 'The angles opposite the equal sides are equal.'

Proposition B, Converse to *A* (*Euclid* I. 6)—
The Hypothesis is 'Two angles of a triangle are equal.'
The Conclusion is 'The sides opposite the equal angles are equal.'

As in this instance, Converse Propositions lend themselve readily to indirect proof by means of the method '*Reductio ad absurdum.*'

Again, let us examine Euclid I. 4 as an instance of TWO Converse Propositions.

Proposition A, Hypothesis—
Two sides of one triangle equal each to each to two sides of another triangle.
The included angles equal.
Conclusion—
The bases equal.

Proposition B, Converse of A, Hypothesis—
Two sides of one triangle equal each to each to two sides of another triangle.
The bases equal.
Conclusion—
The included angles equal.

Proposition B.B. Second Converse of A :—
Hypothesis.—The bases equal.
The included angles equal.
Conclusion.—The sides are equal each to each.

This converse is often false, and to rectify it another condition must be added to the hypothesis, viz., that 'the areas of the triangles are also equal.'

Even in simple propositions the converse is not always true. It is true that 'If two triangles have all their sides equal to one another each to each, they have also all their angles equal to one another each to each'; but it is false (taken universally) that 'If two triangles have their three angles equal to one another each to each, they shall likewise have their three sides equal to one another each to each.

When a false converse proposition is converted into a true one by an addition to the hypothesis, this addition forms in the original Proposition a true (even if unmentioned) portion of the conclusion.

Thus it is true that 'If two triangles have their three angles equal to one another each to each, *and likewise have their areas equal*, they have their three sides equal each to each.'

Euclid does not always insert even the true converses of his theorems, *e.g.*, Converses of I. 34 :—

'If in any quadrilateral the opposite sides and angles are equal, the figure is a parallelogram' :—

Our Readers should write out in their note books all the converse propositions, stating whether they be true or false, and what further hypothesis is required to rectify the conclusion.

III. THE MS. EXAMINATION BOOK.

This consists of six leaves (in addition to cover) of excellent white foolscap, ruled on the right-hand side with thirty-two lines for answering, and left blank for rough work on the left-hand, or under side of leaf. About one-fifth of the ruled side is, on the left, occupied by an unruled margin, which must not be in any way used by the Candidate, but must be scrupulously reserved for the Examiner's marks.

iii. SCHOLARSHIP QUESTIONS, 1892.

Subject	No. of Questions.	No. of Answers Allowed.	Total Time.	Average time per Answer.	Average space per Answer.
			hours.	minutes.	lines.†
Arithmetic (Men)	17*	14*	3	13	11
Euclid, Algebra, and Mensuration.	18*	18*	3	10	9
Arithmetic (Women).	16*	12*	3	15	13
Domestic Economy	14	5	2½	30	31
Geography	11*	5	3	18	15
History	7*	5*			
School Management.	17*	8*	2½	19	19
English	11*	6*	2½	25	26
Music	6	4	45 min.	11	Allotted
Latin	8*	8*	2 hours	15	19 lines
German	5*	5*	2 ,,	24	31 ,,
French	5*	5*	2 ,,	24	31 ,,
Greek	8*	8*	2 ,,	15	19 ,,
Hebrew	11*	6*	2 ,,	20	26 ,,

No. of Questions marked thus (*) is not the nominal but the actual number, for two distinct questions are often placed under one head.

† '*Lines per answer*,' means *full* lines undiminished by margin.

In the Mathematics only is the space circumscribed, but several of the questions can be answered in less than eight lines. Nevertheless it is advisable in the Euclid portion, to write in two vertical columns on one page, and thus save space.

4. SALIENT POINTS FOR REVISION.

It is now too late to attempt to gain *fresh* information or to acquire a knowledge of *new* principles; all that can yet be done, and done with advantage, is revision of such points as the following :—

(*a*) *Arithmetic.*—Proofs of rules, discount and stocks.

(*b*) *Euclid.*—The ordinary deductions, algebraical proofs of Book II., converses, corollaries, and the text itself.

(*c*) *Algebra.*—Proofs of rules, etc., but see former part of this article.

(*d*) *Mensuration.*—The formulæ.

(*e*) *Domestic Economy.*—Properties of clothing materials, post-office facilities for saving, modes of cooking, 'first-aid' for accidents, washing.

(*f*) *Geography.*—Fourth-year maps, Hindostan, latitude and longitude.

(*g*) *History.*—Dates, Irish affairs, lives of great men.

(*h*) *School-Management.* — The Code omits Schedules, Notes of Lessons, Rewards and Punishments. Read the articles on 'Scholarship School Management,' by *Mr. Flux*, in the 'INFANTS' MISTRESS.'

(*i*) *Language.*—Grammar up to end of irregular verbs. Revise the 'Author.'

V. EXAMINATION HINTS.

(*a*) Don't work after mid-day on Monday, 3rd June.

(*b*) Lodge near the examination room.

(*c*) Leave all study books at home.

(*d*) Take plenty of moderate exercise in examination intervals.

(*e*) Live plainly and regularly. Abstain from intoxicants.

(*f*) Head your papers first, and comply to the minutest iota with the printed and oral directions.

(*g*) Connive at no breach of regulations.

(*h*) Work with watch upon desk.

(*i*) Answer the easiest questions first.

(*j*) Don't omit deductions in Euclid, proofs in arithmetic and algebra, maps in geography, dates in history, notes of lessons in school management.

(*k*) Be sure to work the music paper.

(*l*) Take with you all requisite particulars as to science, drawing, &c.

(*m*) Don't forget your examination 'permit.'

(*n*) Continue in the examination room to the last, revising and re-revising.

(*o*) Revise each mathematical step as set down.

(*p*) Draw a plain map at first, afterwards elaborate if there be time.

(*q*) Take into the examination room an assortment of pens, red ink, black, blue and red leads, penknife and india-rubber, and no other implement whatever.

(*r*) Don't write in the margin or between lines. This is worse than useless.

(*s*) Don't write round the question, get to the point.

(*t*) Where possible, draw up on scribbling side a synopsis of intended answer.

(*u*) Practise the copy-setting before writing the specimen.

(*v*) Use only the authorised contractions in Euclid and Parsing.

N.B. Look out for 'Scholarship Model Answers' in our August Number.

(*For Correspondence, see end of Certificate Article.*)

LEGAL AND CODE QUERIES COLUMN.

RULES.

1. All communications must be addressed 'Legal Editor, PRACTICAL TEACHER, 5, Pilgrim Street, Ludgate Hill, E.C.,' and must be accompanied by our 'coupon,' duly filled up.
2. Replies will be given *only* in this column, except under the conditions named in Rule 3.
3. If any reader desires a reply by post, such can be forwarded by enclosing, in addition to the coupon, a stamped addressed envelope and a shilling Postal Order.
4. No original documents should be forwarded, but copies only. We cannot hold ourselves responsible for any losses which occur through non-observance of this rule.

'DOUBTFUL' asks me to state the conditions under which a child between the ages of 10 and 13 years may be employed.—There is much confusion on this point, and it is difficult to state the case clearly and yet succinctly. Children between the ages of 10 and 13 years must have passed the Standard fixed by the Local Bye Laws, either for partial or total exemption, before they can be employed. When a child between these ages has passed such Standard, he can be employed, either full or half time as the case may be, anywhere *except* in workshop, factory, or mine. With regard to the factory and workshop, no child under the age of 11 can be employed either full or half time. When the age of 11 has been reached, he—*i.e.*, the child who has passed the requisite Standard—may be employed half time in either of these places, but not full time, although he may have passed the full exemption Standard. He may be employed full time elsewhere, but not in the factory or workshop. This prohibition extends until he has reached the age of 13 years. With regard to employment in a mine, no child can be employed until he reaches the age of 12 years, and then only when he has passed the Standard required by the bye-laws in force in the district. There is at present a Bill before the House of Commons, backed by Mr. Acland, which, if passed, will alter these conditions.

'LEGACY DUTY' is 'a tax paid to the Government on legacies, rising from 1 to 10 per cent. in proportion to the distance of relationship between the testator and the legatee.'

'J.M.'—'The least touch of another in anger is a battery, for the law cannot draw the line between different degrees of violence, and, therefore, totally prohibits the first and lowest stage of it, every man's person being sacred, and no other having a right to meddle with it in the slightest manner.' (Per L.C.J. Holt.)

'W.S.'—'So long as there are vacant places in the school, children from outside the parish must be admitted. If, however, a school is more than full, and in order to avoid loss of grant a reduction must be made in the average attendance, the excluded children must be those whose parents or guardians reside outside the "school district." So long as there is room in a School Board School, unoccupied by children of the district for which the school is provided, the Department will not consider non-residence in the district as a "reasonable ground" (Art. 78, Code) for exclusion.' (Yoxall and Organ's Code, page 249.)

'L.R.'—Yes, most certainly.

'W.G.'—If you will kindly send copy of the agreement, I shall be glad to advise.

'PHOTOGRAPH.'—The photographer has no right to publish your 'carte,' the negative of which he executed in the ordinary way of business. The copyright of the photograph is yours; and if it be published without your consent you have a right of action for breach of contract and breach of faith. (25 & 26 Vict. c. 68, sec. 1; and Pollard *v.* Photographic Company, 58 L. J., Ch. 293.)

Replies by Post have been forwarded to S.G., W.L., R.S., A.E.M., R.P., and T.E.H.

OUR 1893 CERTIFICATE CLASS.

BY DR. GEORGE BEACH, M.A.

Co-Author of a 'Manual of our Mother Tongue,' 'A Girls' Arithmetic,' Author of 'Elements of English,' 'Entertaining Readers, etc.'

I. (*a*) The most important provisions of the new Evening Continuation School Code should be learnt.

(*b*) To those of our readers who have been inquiring respecting a Classical Atlas, we can thoroughly recommend Messrs. W. and A. K. Johnstone's, 23 maps, price 5s.

(*c*) We would also call attention to Gregory and Christie's Advanced Physiography, which is by far the most concise, readable, and modern book on this subject. Those who know Mr. Gregory's previous works will endorse our recommendation on faith.

(*d*) It will be seen that we are inserting analyses of questions actually given upon the very points of 1893 study. Our Pupils should carefully peruse these, and although these are too extended to admit of every detail being answered on paper, yet, whether the reader is conversant with the facts or not, is easily discovered, and so every defect may by a little work be mended.

(*e*) *From 'The Schoolmaster.'*

Syllabus writes:—'Some weeks ago, I wrote you asking if the Sciences which had counted in the First Year Certificate Examination would again count as a group in the Second Year. I have now obtained an official reply from the Department, which I thought you would be pleased to know:—

"Adverting to your letter of 21st May, I am directed to state that there is no rule at present which prevents an Acting Teacher from counting the same Science over again in his Second Year."'

II. *The difficult words* to be parsed are as follows:—

FIRST YEAR.

(*a*) (*Men.*) *All, twain, rich, who, mage, knowing, tipt, spire, anon, good.*

(*Women.*) *Serpent, whose, stirred, what, aspiring, to have equalled, if, opposed, proud.* (First Friday.)

(*b*) (*Men.*) *All, under, coming, close, last, for, ye, yonder, drink, wherefore, dressing.*

(*Women.*) *There, than, like, though, less, above, so, was, confirmed, thither, bend, what, where.* (Third Monday.)

SECOND YEAR.

(*a*) (*Men.*) *To do, as, calling, home, abroad, snares, producing, fiend-like, who, as, off, this, calls, thanks, whom.*

(*Women.*) *Captains, bear, like, soldier, for, likely, to have proved, soldiers', speak, up, such, as, this, amiss, shoot.* (Third Friday.)

(*b*) (*Men.*) *Doubtful, as, that, worthy, for, that, fortune, smiling, like, minion, till.*

(*Women.*) *Mote, little, ere, gibber, as, stars, disasters, whose, almost, even, as, preceding.* (Fourth Monday.)

III. GOVERNMENT QUESTIONS ALREADY SET RESPECTING THE EIGHTEENTH CENTURY (*continued from p.* 689).

61. Describe the danger that threatened England in the year 1796. With what nations was England at war from 1790 to 1800? (1879.)

62. Give the principal events connected with Paris, Boston Harbour, Philadelphia, Bunker's Hill, and Gibraltar, from 1769 to 1783. (1879), (1887), (1890).

63. Name the chief statesmen during the reign of George II., and write a life of Chatham. (1880), (1882), (1888).

64. Give some account of the successive elections of Wilkes for Middlesex. Name the chief points in which the electoral law has been altered since that date. (1800), (1886), (1887).

65. Show that Pitt was financially more enlightened than his contemporaries. (1880.)

66. Give some account of the writings of Addison, Steele, and Swift. Compare the periodical literature of Queen Anne with that of the present day. (1880), (1882).

67. Describe the Assiento Contract. (1880).

68. Write a brief life of some distinguished Scotchman who flourished in the eighteenth century. (1881), (1884).

69. Give some account of the policy and measures of the twelve years' ministry of Lord North. (1881.)

70. Write a short account of the career of Hyder Ali. (1881.)

71. Give some account of Pitt's policy towards Ireland. (1881.)

72. Describe the state of Ireland in the years 1795–96. (1881.)

73. What celebrated authors, poets, historians, novelists, political writers, and artists, lived in the reign of George III.? Give some account of two of them. (1881), (1882).

74. What important consequences followed upon the battles of the Nile and Quebec? Name some of the chief differences between the weapons of war employed in these battles and in modern warfare. (1881), (1882), (1888), (1891), (1892).

75. The reign of George III. has been described as '*the most eventful period in the annals of mankind.*' Can you justify this description? (1882.)

76. Describe the condition of Ireland *or* of Scotland during the eighteenth century. (1882), (1883), (1888).

77. Give some account of the political changes for which the years 1776 and 1789 are memorable. (1882.)

78. What sovereigns of France and Spain were contemporary with Anne and George III.? (1882.)

79. Give the provisions of the treaty of Paris, 1763. (1883), (1885).

80. Give some account of the ministry of Lord Chatham, 1766–1770. (1883).

81. What is meant by the 'Balance of Power'? Which was the most powerful foreign nation in 1760? How had it acquired that power? (1883.)

82. Who were the chief members of the ministry of Rockingham? What were their initial difficulties? (1883.)

83. Name, with dates, the chief events of the latter half of the eighteenth century. (1884.)

84. What do you know of the letters of Junius and the impeachment of Warren Hastings? (1884), (1885), (1892).

85. What do you know of Major André and Franklin? (1885.)

86. In the reign of Queen Anne literary men began to obtain political appointments. What instances can you give of this? (1885.)

87. What was the general object of the Whig ministries of George I. and George II. in their domestic and foreign policy? (1885.)

88. How did George III. succeed in increasing the personal influence of the Crown? Name some of the results of his influence. (1885.)

89. What were the causes which contributed to the success of the movement started by Wesley and Whitfield? (1885.)

90. Trace shortly the growing influence of the press as a power in politics in the reign of George III. (1885.)

IV. ERRATA.

Our readers are asked to make the following corrections of a few errors which crept into the French Model Answers (p. 697).

(*a*) *Section I.* (*c*).—Read, '*much less strong and less active.*'

(*b*) *Section II.*—Read, '*cavau*' or '*caverne*' instead of *voute*.

(*c*) *Section II.*—Read, '*pour les servir*' instead of *leur*.

(*d*) *Section II.* (p. 698).—Read, '*collet*' instead of *collier*.

V. MODEL ANSWERS.

ENGLISH HISTORY.

(*Male Candidates.—First Year.*)

1. Describes the measures, other than military operations, which William I. took to make his conquest of England secure. What reforms were made by Lanfranc?

(*a*) The Conqueror ensured his conquest by establishing the Feudal System in England. The tenure of land was annexed to military service. The land was divided into estates called 'fiefs,' and the barons as holders of these fiefs were expected to render military service in time of war, and also to pay homage to the sovereign. The larger estates were divided by their owners into smaller sub-tenancies; and the under-tenants were bound by the same condition of service to their lord. A whole army was by this means encamped on the soil, and the king's summons could at any time gather 60,000 knights to the royal standard.

(*b*) William removed nearly all the Englishmen who held high offices in church and state, and replaced them by his Norman followers.

(*c*) His policy towards the conquered Saxons was one of strong coercion. They were reduced to servility and poverty. His arbitrary government is manifested particularly in the cruel Forest Laws.

(*d*) Numerous castles and fortresses were erected to overawe his Saxon subjects.

(*e*) The Curfew Bell is thought by many to have been rung as a means of preventing meetings and conspiracies among the malcontents.

Lanfranc often used his influence in the support of justice, and the protection of the conquered Saxons. To his firmness the church of Canterbury owed a great part of her possessions, which he wrested from the tenacious grasp of the conquerors. He rebuilt the cathedral, which had been destroyed by fire, repaired many of the devastations occasioned by the war, and founded two opulent hospitals.

2. Name briefly the chief events which followed the mediation of Edward I. between the claimants to the Scottish throne down to the time of his death.

In 1296 Baliol, on whom the crown had been conferred, refused to appear before Edward as his feudal lord. The English king immediately declared war. The Scots were defeated by the Earl of Surrey at Dunbar; Baliol made his submission, and was sent to the tower. In 1297, the Scots under Wallace rose against the English, and utterly routed them at Cambuskenneth. Wallace was afterwards defeated at Falkirk (1298). In 1304, Stirling Castle surrendered to the English, and in the following year Wallace was captured and executed. Robert Bruce, grandson of one of the competitors to the Scotch crown, now assumed the title of king. He was defeated at Methven, but in 1307 he inflicted defeat on the English at Loudan Hill. Edward made preparations to invade Scotland, but his own death intervened.

3. Write a short account of the Lancastrian Restoration, from the landing of Warwick in England to the death of Henry VI.

In the year 1470, Warwick, Clarence, and Queen Margaret became reconciled in France; Warwick landed in England, and proclaimed Henry VI. king. Edward, finding Warwick with an increasing army of 60,000 men, and being himself almost deserted, fled to Flanders. Warwick was now master of England; he hastened to London, released Henry from the tower, and had himself proclaimed Regent. The following year Edward landed in England to recover his kingdom. He was soon joined by the Duke of Clarence. Adherents flocked to his standard, and, advancing to meet Warwick, he defeated him at Barnet. In this battle Warwick, 'The King Maker,' was slain. The same day Margaret and her son, supported by a small body of French troops, landed at Weymouth. They were totally defeated at Tewkesbury, and the queen and her son were taken prisoners. Margaret was thrown into the tower, and Prince Edward was assassinated. Henry VI. expired in the tower a few days after the battle of Tewkesbury, but whether he died a natural or violent death is uncertain.

4. Enlarge and explain the following statement :—'It was the time of the English Renascence, and of the Elizabethan Drama. Englishmen now first became great sailors, engaged in foreign trade, and attempted colonisation.'

The reign of Elizabeth marked a revival of classical study, which is often referred to as the Renascence. The decay of the Roman Empire had caused a westward migration of Latin and Greek scholars, and their influence brought about a revival of the study of those languages. Grammar Schools increased throughout the land. Classical learning at the Universities received an impetus. The love of travel quickened the intelligence and widened the knowledge of the people. During this period there was quite a large number of celebrated poets and dramatists. The drama itself made a great advance. The old morality plays and masques were replaced by the grand tragedies and comedies of Shakespeare and his contemporaries. Green and Marlowe were amongst the earliest of these dramatists. 'Faustus,' by the latter poet, was the first attempt to touch the great problem of man in his relation to the unseen world. Shakespeare also gave to the world his sublime dramas. Ben Jonson, Beaumont, Fletcher, Ford, Shirley, and Massenger are also names connected with the Elizabethan drama. The wealth of Spanish America induced many bold seamen to sail westward in the hope of conquest and plunder. Among these daring sailors were Drake, Raleigh, Hawkins, Frobisher, and Howard. In 1580 Sir Francis Drake completed his voyage round the world. Colonisation was also attempted by Raleigh, who founded Virginia in 1584. In 1600 the East India Company was established, and thus the first step was taken towards the foundation of our Indian Empire.

5. What was Walpole's home policy, and foreign policy from his accession to office, after the 'South Sea Bubble,' to the commencement of the war of the Spanish Succession?

Walpole was England's first great peace minister. He was essentially a master of finance. He believed that the most pernicious circumstances a country can be in are those of war. (*a*) He regarded the development of national wealth, and the adjustment of national burdens to be the great business of a statesman. He practised a rigid economy, and aimed at a reduction of the national debt, together with a diminution of the fiscal laws. In the first year of his administration he removed the duties from more than a hundred British exports, and forty articles of importation. He removed many restrictions from the commerce of our colonies. Manufactures, agriculture, and commerce made tremendous strides, and the populations of our great centres of industry vastly increased. His Excise Bill of 1733 established bonded warehouses, and thus removed the collection of duties from the form of Customs to that of Excise. (*b*) His foreign policy was to maintain peace if possible. The war with Spain was concluded mainly by his efforts, although the belligerent mind of the nation was far from satisfied. On his resignation he was made Earl of Orford, and soon afterwards retired from politics.

6. What events are connected with Lexington, Arcot, Assaye, Badajoz, Amiens, Vinegar Hill, and Prestonpans?

Lexington.—The American War of Independence commenced with a skirmish at Lexington (1775), which is fifteen miles from Boston.

Arcot.—Towards the latter part of George II.'s reign the French made a determined effort to establish their power in India. Dupleix, the Governor of Pondicherry, formed an alliance with the Nabob of the Carnatic, in the hopes of expelling the English. Clive, with a small army of English and Sepoys, attacked Arcot, the Nabob's capital, and having captured it, entrenched himself in its fortress, and held it for 50 days, against thousands of assailants. When the siege was raised by the help of the Mahrattas, Clive with a very small force attacked the French and their allies, and defeated them (A.D. 1751).

Assaye.—General Wellesley, afterwards Duke of Wellington, defeated the Mahrattas (1703).

Badajoz.—Famous for events connected with the Peninsular War. Marshal Beresford besieged this fortress, and Soult marched to its relief (May 15th, 1811). An engagement ensued in which the French were repulsed. In 1812 Badajoz was again besieged by Wellington, and notwithstanding the unparalleled defences, the place was taken by storm; it yielded 4,000 prisoners and large quantities of stores, but the English experienced great loss.

Amiens.—Famous for the Treaty of Amiens, between England, France, Spain, and Holland (1802). England surrendered all conquests acquired during the recent war, except Ceylon and Trinidad, and Malta was given back to the knights of St. John.

Vinegar Hill.—In 1798 the Irish rebellion broke out. General Lake, with a force of 10,000 men, defeated the rebels at Vinegar Hill.

Prestonpans was the scene of the victory of the Scotch rebels. In 1745 Charles Edward, the Young Pretender, landed in Scotland, and the clansmen at once flocked to his standard. He was attacked by General Cope, but a panic seized the English, who fled ignominiously, leaving the Pretender master of Scotland.

7. On what occasions did the Commons impeach the ministers of the Stuart kings? Mention the principal charges in each case.

Lord Bacon was impeached for bribery and corruption in his office as Lord Chancellor (1621).

The Earl of Middlesex.—Impeached for using bribery and oppression in his office as Lord Treasurer (1624).

The Duke of Buckingham was impeached by the Commons in 1626. The principal charges were:—(*a*) Uniting many offices in his person; (*b*) neglecting to guard the seas; (*c*) delivering ships to the French king in order to serve against the Huguenots; (*d*) accepting grants from the crown; (*e*) procuring honours for his kindred; (*f*) administering physic to the late king without the knowledge of his physicians.

The Earl of Strafford.—Impeached by the Long Parliament. He was charged with attempting to introduce arbitrary government, to subvert the true religion and establish Popery, and to subvert the rights of Parliament (1640).

Laud.—Archbishop Laud was impeached by the same Parliament in 1645. The principal charges against him were:—Tyranny and oppression in the Star Chamber and High Commission Court, and making innovations in religion and doctrine.

The Earl of Clarendon.—Impeached of high treason (1667).

Danby was charged with entering into illegal and treacherous correspondence with France (1678).

Lord Russell and Algernon Sydney were tried for being connected with the Rye House Plot (1683).

8. 1644 was the critical year of the Civil War. Briefly trace the chief events of the struggle in that year.

In the early part of the year the King assembled a rival Parliament at Oxford, which was attended by 45 Peers and 118 Commoners. The Scots invaded England to aid the Long Parliament. Ormonde, the king's lieutenant in Ireland, sent troops to assist the Royalists, but they were defeated by Fairfax at Nantwich. The King sent orders to Prince Rupert to collect all his forces and hasten to Yorkshire to attack the allied Scots and Parliamentarians. The siege of York was raised by the Royalists, but they were utterly routed by Cromwell's Ironsides at Marston Moor. This was followed by an indecisive battle at Newbury.

9. Give an account of the relations of the Commonwealth with foreign powers.

In 1651 the Navigation Act was passed, which aimed a blow at the Dutch carrying trade. War ensued with Holland, and the Dutch were defeated off Dover, and also off Plymouth (1652). Other naval engagements followed in the Downs, and off the North Foreland, and Texel. Peace was concluded in 1654. It was agreed that the Dutch should not give any assistance to the Royalists, that they should respect the Commonwealth, and should pay the English East India Company £170,000 as compensation for damages. The Protector removed hindrances to trade by concluding a treaty with France. He demanded from Spain freedom of trade with the West Indies, and a guarantee that English traders should not be molested by the Inquisition. This was refused, and in the war which followed, Jamaica was taken from Spain by the British (1655). Cromwell also obtained a promise from Algeria to respect the English flag, and on the Dey of Tunis refusing to do so, Blake silenced his castles and destroyed his fleet. From the Duke of Tuscany a payment of £60,000 was enforced for damages done to English commerce.

10. From what contemporary writers have we an account of the times of Charles I. and Charles II.?

(1) Laud's Diary contains much ecclesiastical information.

(2) Clarendon's History is an important authority on the social and military state of England during the reign of Charles I.

(3) Milton's 'Defence of the People of England,' and also 'Eikonoclastes' also contain much information relating to the same period.

(4) Cromwell's Letters and Speeches, Sir Thomas Herbert's Memoirs, and Sir James Turner's Memoirs, throw much light

on the latter part of the reign of Charles I. The Memoirs of Major Hutchinson, and of Hollis, also bear on the same era.

(5) Pepy's Diary contains pictures of the social state of England, as also do the Memoirs of Evelyn.

(6) Dryden's 'Annus Mirabilis' and Defoe's History of the Plague, contain graphic pictures of England in the years 1666 and 1667.

(7) Richard Baxter's Autobiography relates to the reign of Charles II., as also do the works of Burnet, and the Memoirs of Sir Wm. Temple.

(8) The Works of Bunyan contain much relating to the religious state of England, whilst the Dramatic Works of Wycherley and others give much information about the social life of England.

(9) Prynne's Histrio-Mastix relates to the drama of the period.

11. Sketch the career of two of the following :—Shaftesbury, Strafford, Robert Cecil, Marlborough.

Thomas Wentworth was born in Yorkshire in 1593. He sat in two Parliaments in the reign of James I., but did not take a prominent part. In 1627 he was imprisoned for refusing to pay a forced loan, and in all his early actions he took the side of the Parliament in resisting the arbitrary government of the king. Impelled by ambition, however, he changed his policy, relinquished his democratic principles, and was made Baron Wentworth. He was made President of the Council of the North, and a Privy Councillor. In 1633 he was made Deputy of Ireland, and his government of that country was marked by tyranny and oppression. He attempted to introduce absolute government, and urged the king to adopt the policy which he termed the 'Thorough.' In 1640 he was made Earl of Strafford. He was impeached by Pym, and executed in 1641. He employed all his powers for the purpose of crushing those liberties of which he had been so distinguished a champion. His counsels were fierce and tyrannical.

John Churchill, Duke of Marlborough.—This celebrated general was born in Devonshire in 1650. He married Sarah Jennings, and in the reign of Charles II. served in the Low Countries. He rendered material aid in quenching the rebellion of Monmouth. When the Revolution occurred he deserted James, and was made Duke of Marlborough. He greatly distinguished himself in the War of the Spanish Succession, winning the glorious victories of Blenheim, Malplaquet, Oudenarde, and Ramillies. His wife was a great favourite with Queen Anne, and may be said to have virtually ruled England. By the intrigues of Harley and St. John, Lady Marlborough became estranged from her royal mistress, and was supplanted by Mrs. Masham. Grave charges of misappropriation and dishonesty were brought against the Duke, and his reputation suffered greatly. His enemies, the Tories, so triumphed over him that he sought refuge on the continent, He returned to England after the death of Anne, and was restored to his dignities and offices, but no great confidence was placed in him. In military tactics, Marlborough was the greatest general of his age, and in diplomacy not inferior to many who make it a profession. The charges of peculation and meanness had in them as much of party spite as truth, and their truth is undoubted.

12. Give a short account of the home government of William III.

Though the crown was shared by William and Mary the government was entirely committed to the king. He selected his ministers from both political parties, excluding all who were Jacobites, and conferring high offices on many of his Dutch supporters, amongst whom were Bentinck, Schomberg, and Auverquerque. Owing to a mutiny among a Scotch regiment, William brought in the first Mutiny Act (1689). Troops were thus placed under martial law. The army was remodelled, and several doubtful regiments were sent to Flanders and replaced by Dutch troops. Freedom of worship was secured to Protestant dissenters by the Toleration Act, but there was no relaxation of the penal laws against Roman Catholics and Unitarians. The Primate, Sancroft, and seven other bishops having refused to take the oath of allegiance they were suspended. Other clergymen followed their example, and were termed Non-jurors. They also suffered deprivation. The Bill of Rights, which was passed in 1689, forms, after the Magna Charta and Petition of Right, the third great charter of English liberty. His excellence lay in action. He manifested his energy and promptitude in his treatment of the malcontents in Ireland and Scotland, albeit the Massacre of Glencoe will always remain a dark stain on his memory. In 1694 Parliaments were made triennial; the Bank of England was incorporated, and a Cabinet ministry was first established. In 1701 the Act of Settlement was passed.

SELECTED GOVERNMENT QUESTIONS.

FIRST YEAR.

SECOND WEEK.

1. Write in Large-hand the words '*Physiologically.*'

Write in Small-hand the words '*He is the freeman whom the the truth makes free.*'

2. Write from Dictation :—

'We may remark of the middle station of life, that it is more favourable to the acquiring of wisdom and ability, as well as of virtue, and that a man so situate has a better chance for attaining a knowledge both of men and things than those of a more elevated station. He enters with more familiarity into human life; and everything appears in its natural colours before him: he has more leisure to form observations; and has, besides, the motive of ambition to push him on in his attainments, being certain that he can never rise to any distinction or eminence in the world without his own industry.'—*Hume.*

3. What is meant by the faculty of *Observation*, and why is it desirable to cultivate it? Give some examples of exercises calculated to strengthen this faculty (*a*) in a rural school, and (*b*) in a school situated in a large town.

4. Describe the kind of manual employments best suited to give to very little children, ideas of form and construction, and to give early training in invention and design.

5. Note tests for Division III. in schools include—

A series of notes in the Key of C containing an F sharp contradicted by an F natural, and a B flat contradicted by a B natural, the F sharp to be approached by G, and to return to G, and the B flat to be approached by C and to be followed by A. OR,

Simple passages in the major diatonic scale including **fe** *and* **ta** *in stepwise progression used thus,* **s fe s : d' ta l.**

Write a test of about 20 notes in accordance with the requirements.

6. State the meanings of the following terms—

Lento, Legato, Dolce, Non troppo, Tempo giusto, Dal Segno and Rallentando.

7. Describe the characteristics of the versification employed by Tennyson *or* Milton. What was the contemporary, and what is now the opinion held of their poetical rank.

8. Parse the words printed in italic in the following extracts :—

(*Men only.*)

(*a*) Yet our language *affirms as much.*

(*b*) Our weekly newspapers commit *no* absurdity in *calling themselves journals.*

(*c*) Very *curious* is *it to watch* the varying fortunes of words.

(*d*) A volume *might be written such as* would have few to rival it.

(*Women only.*)

'*Either* to *disenthrone* the King of Heaven
We war, *if* war *be* best, or to regain
Our own right *lost.* *Him* to unthrone we then
May hope, when everlasting Fate shall yield
To fickle Chance, and Chaos *judge* the strife.
The *former, vain* to hope, argues *as vain*
The *latter; for* what place can *be* for us
Within Heaven's bound *unless* Heaven's *Lord Supreme*
We overpower.'

9. Draw a map of Palestine.

10. (*Men only.*) Describe minutely the mineral wealth of Asia.

(*Women only.*) Describe the Dependency of Ceylon. Relate the circumstances which gave rise to our annexation of Burmah.

11. Write a short account of four of the following :—Dunstan, Thomas Cromwell, William Wallace, the Duke of Marlborough, Walpole, and the Earl of Beaconsfield.

12. (*Men only.*) Give an account of the state of parties in Ireland which led to the insurrection in that country in 1798.

(*Women only.*) What do you know about the condition of the labourers and the state of commerce in the reign of Edward III.?

13. What, in common language, is the rate per cent. when it is expressed by the decimal ·045? Find the interest on £1,937 10s. for 6 years at the above rate per cent. simple interest.

Ans. 4½; £523 2s. 6d.

14. Simplify $\frac{2\cdot\dot{3}59\dot{2}}{3\cdot3029} \div \frac{4\cdot\dot{8}58\dot{4}}{6\cdot80\dot{1}8}$

Ans. 1.

15. (*Men only.*) Find the area of a circle inscribed in a triangle whose sides are 4, 5, 7 feet respectively. Ans. 4·71237 sq. ft.

(*Women only.*) Describe the ordinary faults of sewing in infants' schools.

16. (*Men only.*) A road runs round a circular shrubbery. Its outer circumference is 440 feet, and its inner 352 feet. Find the area of the road. Ans. 5,544 sq. ft.

(*Women only.*) Compare the constituents and explain the relative values of coffee, cocoa, tea, ale, and whiskey. Point out what bodily risks may be connected with the use of any one of them.

17. (*Men only.*) Prove that when $n+2$ figures of a cube root have been obtained by the ordinary method, n more may be obtained by division only, supposing $2n+2$ to be the number of figures in the cube.

Find the cube root of $x^6-9x^5+33x^4-63x^3+66x^2-36x+8$.
Ans. x^2-2x+2.

(*Women only.*) Why is cleanliness in and about the house conducive to health? How would you clean saucepans, tins, windows, and boarded floors?

18. (*Men only.*) What are eggs per dozen when two more in the shilling's worth lowers the price 1d. per dozen? Ans. 9d.

(*Women only.*) Mention the different common English wild poisonous plants; and so describe them that a child may be warned against them.

19. (*Men only.*) Write out Euclid I. 47.
Give the base, area, and difference of the squares on the sides, construct the triangle.

(*Women only.*) If 2 horses = 5 oxen, and 3 oxen = 16 sheep, and 1 sheep = £3 15s., what is the value of a horse? Ans. £50.

20. (*Men only.*) Write out Euclid III. 26.
The straight lines which bisect the vertical angles of all triangles on the same base and on the same side of it, meet in a point when these angles are equal.

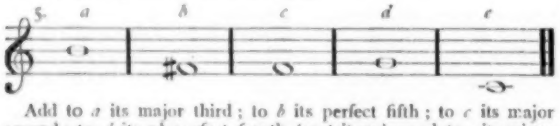
Fourth Week.

1. Write in Large-hand the words '*Gastronomical Propensities.*'
Write in Small-hand the words, '*An honest man is the noblest work of God.*'

2. Write from Dictation :—
"History must supply the writer with the rudiments of narration, which he must improve and exalt by a nobler art, must animate by dramatic energy, and diversify by retrospection and anticipation; morality must teach him the exact bounds and different shades of vice and virtue; from policy and the practice of life, he has to learn the discriminations of character, and the tendency of the passions either singly or combined; and physiology must supply him with illustrations and images. To put these materials to poetical use, is required an imagination capable of painting nature, and realizing fiction."—*Johnson.*

3. (*a*) What are the advantages of a separate classification in Arithmetic?
(*b*) Why should caning on the hand be absolutely prohibited in schools?
(*c*) Why do younger children require shorter lessons than their elders?
(*d*) In what respects is long standing in class prejudicial?

4. Explain briefly the *Phonic* and *Look-and-Say* methods of teaching to read; and give examples of words which are more easily taught by each of these methods.

5. 

Add to *a* its major third; to *b* its perfect fifth; to *c* its major second; to *d* its pluperfect fourth (or tritone); and to *e* its minor seventh, OR in *tonic-solfa*,

t :—	fe :—	f :—	s :—	d :	‖

6. Write the following in $\frac{3}{4}$ time :—

Make what alteration is required, so that the following shall appear in six pulse measure :—

Key C.

s	:l	:s	d'	:-.t	:l.s	l.t	:d'	:r'	m'	:—	:‖

7. (*Men only.*) Give particulars respecting the origin of the words *America, infanticide, cosmopolite, extradition, beatitude, alligator.*

(*Women only.*) 'Milton saw nature,' as Dryden expressed it, '*through the spectacles of books.*' Explain and illustrate this statement.

8. (*Men only.*) Give instances of Tennyson's love of monosyllabic and Saxon words.

(*Women only.*) How far was Milton indebted to preceding authors for his conception and execution of 'Paradise Lost'?

9. Briefly describe the chief plateaux and valleys of Asia.

10. Enumerate, giving source, direction, and length of course, area of basin and commercial value, the rivers of E. coast of Asia.

11. Give particulars of First and Second Triple Alliances and First and Second Quadruple Alliances.

12. (*Men only.*) Describe the Porteous Riots and the Wilkes Riots.

(*Women only.*) '*In* 1770 *the long Whig supremacy ended.*' Give details of this supremacy, stating the reasons of its continuance and fall.

13. The train which leaves London at 3.10 p.m. arrives at Winchester at 5 p.m. The train which leaves Winchester at 3.30 p.m. arrives in London at 5.42 p.m. When do they pass each other?
Ans. $19\frac{3}{11}$ minutes past 4.

14. I have a certain sum of money, wherewith to buy a certain number of nuts, and I find if I buy at the rate of 40 a penny I shall spend 5d. too much. If at the rate of 50 a penny 10d. too little. How much have I to spend? Ans. 5s. 10d.

15. (*Men only.*) The area of a rhombus is 354,144 square feet, and one diagonal is 672 feet. Find the other diagonal. Find also the length of a side, and the height of the rhombus.
Ans. 1054; 625; 566·6304 ft.

(*Women only.*) Give directions to a First Class for setting in a patch, stating your reasons for each step in the process.

16. (*Men only.*) The radius of a circle is 10 feet. Two parallel chords are drawn, each equal to the radius. Find the area of the zone between the chords. Ans. 296·04 sq. ft.

(*Women only.*) Give recipes for a meat pudding, a light pudding for invalids, and a meal soup.

17. (*Men only.*) What is the greatest number of 4 digits whose digits are in Arith. Progression? Ans. 9876.

Prove the rule for finding the G.C.M. of two quantities.

(*Women only.*) What is starch? How is it manufactured, and how prepared for use?

18. (*Men only.*) If $a:b :: c:d$, prove that $\frac{a}{p}+\frac{b}{q} : a :: \frac{c}{p}+\frac{d}{q} : c$ and that $\sqrt{(a+b)} : \sqrt{b} :: \sqrt{(c+d)} : \sqrt{d}$.

(*Women only.*) In what ways may dripping be used as a substitute for butter in poor families?

19. (*Men only.*) Write out Euclid II. 1.
How may a rectangle be dissected so as to form an equivalent rectangle of any given length?

(*Women only.*) Writes notes of a lesson on clothing to a First Class.

20. (*Men only.*) Write out Euclid III. 36.
If any parallelogram be described about a circle it must be a rhombus.

SECOND YEAR.

Second Week.

1. As in First Year.

2. As in First Year.

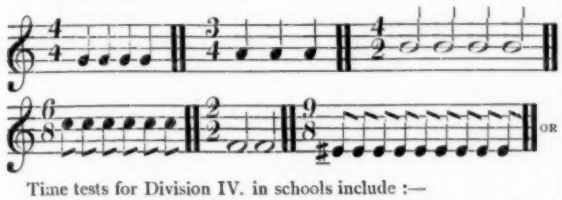
3. Discuss the question whether any, and if so what, interval of time shall be allowed to elapse between the commission of some serious offence in school and its punishment.

4. Criticise the statement: '*At each age the intellectual action which a child likes is a healthy one for it.*'

What are the limits to this principle? OR,

Mention a few points wherein you think Spencer's or Froebel's remarks are incorrect, or inapplicable.

5. Place the letters *S*, *M*, or *W* over the following notes to distinguish respectively the *strong*, *medium*, and *weak* accents :—



Time tests for Division IV. in schools include :—

Series of notes in two-pulse, three-pulse, or four-pulse measure, including pulse-and-a-half notes; also a simple phrase in six-pulse measure, beating twice to the measure.

Write two passages, one in three-pulse, and the other in six-pulse measure, of four measures each, in accordance with these requirements. Vary the contents of the measures.

6. As in First Year.

7. (*Men only.*) Paraphrase—

Gareth loosed his bonds and on free feet
Set him, a stalwart baron, Arthur's friend.
'Well that ye came, or else these caitiff rogues
Had wreaked themselves on me. Good cause is theirs
To hate me, for my wont hath ever been
To catch my thief, and then like vermin here
Drown him, and with a stone about his neck;
And under this wan water many of them
Lie rotting; but at night let go the stone,
And rise, and flickering in a grimly light
Dance on the mere.'

8. (*Men only.*) Write out the substance of Macbeth, Act III., Scene 1.

(*Women only.*) Give instances of words from Bacon's 'Advancement of Learning,' which had only a short existence, and which never had a long popular acceptance.

9. (*Men only.*) As in First Year.

(*Women only.*) Briefly describe the volcanoes of New Zealand, and the rainfall of Australia.

10. (*Men only.*) As in First Year.

(*Women only.*) What do you know of (*a*) The Trossachs, (*b*) Bridgwater Canal, (*c*) Bog of Allen, (*d*) Yarra Yarra, and (*e*) The Crystal Terraces?

11. (*Men only.*) As in First Year.

(*Women only.*) Briefly narrate the rise of the Puritans.

12. (*Men only.*) As in First Year.

(*Women only.*) Enumerate the chief Parliamentary Acts of Religious Intolerance from 1485 to 1603.

13. As in First Year.

14. As in First Year.

15. (*Men only.*) As in First Year.

(*Women only.*) Mark your initials in cross-stitch.

16. (*Men only.*) A garden roller is 11 ft. round, $\frac{3}{4}$ in. thick, and 3 ft. wide. Find its weight, assuming that the handle and other parts weigh $\frac{1}{20}$ of the cylindrical part, and that the weight of a cubic inch is 4·2 ozs. Ans. 7 cwts. 2 qrs. 19 lbs. 5·12 ozs.

(*Women only.*) Draw out Notes of a Lesson on the Principles, Working, and Advantages of Co-operative Stores.

17. (*Men only.*) As in First Year.

(*Women only.*) Name and describe any really good cooking stove or oven for a labourer's cottage. State the cost, and the special advantage which it affords, and draw an outline sketch of it.

18. (*Men only.*) In how many years will a sum of money double itself at Compound Interest? ($\log 2 = \cdot 30103$; $\log 26 = 1\cdot 41497$.) Ans. 17·67 years.

(*Women only.*) Why is nicety of cooking and serving-up so important in the case of invalids? Why should food never be kept in a patient's room?

19. (*Men only.*) As in First Year.

(*Women only.*) Divide £8424 among A, B, and C, so that A shall receive as much as B and C together; and B $\frac{4}{5}$ of what A and C together receive.

Ans. £2592 : £3744 : £2088.

20. (*Men only.*) Write out Euclid VI. 17.

In a triangle ABC, the perpendicular from A meets the side BC in D. If the rectangle BC, CD is equal to the square on AC, or if the rectangle BD, DC is equal to the square on AD, then BAC is a right angle.

FOURTH WEEK.

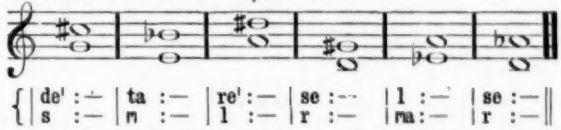
1. As in First Year.

2. ,, ,,

3. What rules would you give to Pupil Teachers on the Art of Putting Questions, and what form of question is likely to prove most stimulating and useful to learners? How far do you think it desirable to encourage in a class the habit of mutual interrogation?

4. How does Spencer enforce his dictum that '*True science is essentially religious*'? OR, What was Froebel's 'Theory of Development?'

5. Write before each of the following pairs of notes the signature of the scale of which it forms part :—



6. What are the average compasses of the Treble, Contralto, Tenor, and Bass Voices?

7. Analyse the following, and parse the italicised words :—
(*Men only.*)

The raven *himself* is hoarse
That croaks the fatal entrance of Duncan
Under my battlements. *Come*, you spirits
That tend on mortal thoughts, unsex *me* here,
And fill me from the crown to the toe *top-full*
Of *direst* cruelty! Make *thick* my blood;
Stop *up* the access and passage to remorse,
That no *compunctious* visitings of nature
Shake my fell purpose, *nor* keep peace between
The effect and *it!* Come to my *woman's* breasts
And take my milk for gall, you murdering *ministers!*

(*Women only.*)

I heard *thee speak me* a speech once, *but* it was never acted; or, *if* it was, not *above* once; *for* the play, I remember, pleased not the million; 'twas *caviare* to the *general*; but it was—*as* I received it, and others whose judgments in such matters, cried in the top of mine—an excellent *play*, well digested in the scenes, *set* down with *as* much modesty *as* cunning.

8. (*Men only.*) Give instances from 'Gareth and Lynette' of Tennyson's minuteness of description, use of similes, and imitative rhythm.

(*Women only.*) What, according to Bacon, are the three distempers, diseases, or vices of learning?

9. (*Men only.*) As in First Year.

(*Women only.*) Draw maps of the Shannon and the Clyde.

10. (*Men only.*) As in First Year.

(*Women only.*) Contrast the colonies of New Zealand and Queensland; and describe the special advantages afforded in them for emigrants.

11. (*Men only.*) As in First Year.

(*Women only.*) What were the immediate causes of Wolsey's disgrace, and the execution of Mary Queen of Scots and of Essex?

12. (*Men only*). As in First Year.

(*Women only.*) Write brief lives of two of the following: Henry VII., Thomas Cromwell, Cardinal Pole, Sir Walter Raleigh.

13. A and B were partners in business. When the profits were divided, A received 5 per cent. on his capital, and B 4 per cent. on his capital. Their united capital was £22,500. If A's share of the profits were the same as B's, how much did each receive?

Ans. £500.

14. As in First Year.

15. (*Men only.*) As in First Year.

(*Women only.*) How should a woman's night-dress be cut out? Illustrate your answer by diagrams, and state the quantity of material required.

CERTIFICATE ROUTINE FOR JULY, 1893 (MEN AND WOMEN, FIRST YEAR).

DAYS	FIRST WEEK.			SECOND WEEK.			THIRD WEEK.			FOURTH WEEK.		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	How to Make a Lesson Interesting	Lecture IV. *or* pp. 50 to 74 of Johnson's 'Milton'	Euclid, Book III., Props. 16 to 24. *or* Composition and Nutritive Value of Food	Graphic Illustrations of Arithmetical Principles	Study Notes to 'Gareth and Lynette,' *or* 'Paradise Lost,' Book I.	Euclid, Book III., Props. 25 to 32, *or* Descriptions of the various stitches	The Common Faults of Child Reasoning	Analyse lines 667 to 677 of 'Geraint and Enid,' *or* 345 to 358 of 'Paradise Lost,' Book II. Parse difficult words	Euclid, Book III., Props. 32 to 37, *or* Any Needlework	Notes of a Lesson on 'Derivation of Words'	Study Notes of 'Geraint and Enid,' *or* 'Paradise Lost,' Book II.	Euclid, Book II., Props. 8 to 14. *or* Diagram of a Woman's Chemise
TUESDAY	Chief Dates from 1783 to 1802	Fractional Equations *or* Repair of Underclothing	Geography of Asiatic Islands	Chief Dates from 1802 to 1815	Algebraic Factors *or* Clothing Outfits	Effects of Climate on Industry, Productions, and National Character	Poetry from 1702 to 1789 *or* Lives of Great Men from 1153 to 1270	Simultaneous Quadratics, *or* Removal of Grease and Ink Spots, Fruit Stains, &c.	Geography of Russian Asia	Chief Dates from 1066 to 1135	Geometrical Progression *or* Ventilation	Map of China
WEDNESDAY	Problems on Least Common Multiple	Complex Fractions	Mensuration *or* Theory of Common Arithmetical Rules	The Metric System	Any Revision	Mensuration *or* Recitation	Any Dates	Compound Proportion and Proportional Parts	Averages	Percentages and Commission	Music — Transcription from one time to another	Lives of Great Men
THURSDAY	History from 1660 to 1689 *or* Struggles in America	Problems involving Simultaneous Simple Equations *or* Description of a Flannel Print and other Patches	Physical Geography of China	History from 1783 to 1792	Quadratic Equations *or* Organs and Processes of Mastication and Digestion	Map of Hindostan	Constitutional Affairs from 1461 to 1660	Arithmetical Progression *or* Warming and Lighting the Home	Political Geography of China	History from 1792 to 1800	Theory and Practice of L.C.M. and G.C.M. of Algebra *or* Diagram of a Pair of Drawers	Physical Geography of Hindostan
FRIDAY	The Human Will	Deductions of Euclid, Book I., *or* Organs and Process of Respiration	Analyse lines 294 to 305 of 'Gareth and Lynette,' and Parse difficult words, *or* Lines 34 to 44 of 'Paradise Lost,' Book I.	Applications and Relations of Long, Square, and Cubic Measures	Select any Archaic or Peculiar Words in 'Paradise Lost,' Book I., or 'Gareth and Lynette,' or 'Tintern Abbey'	How to Conduct a Dictation Lesson	The best methods of preparing for and securing Recapitulation	Deductions of Euclid, Book II., *or* Cutting out of an Infant's Shirt	Read 'Trench,' Lecture V., *or* pp. 1 to 25 of Johnson's 'Milton'	Notes of a Lesson on 'Spacing of Words'	Compound Interest	Grammar from Questions
SATURDAY.	Musical Intervals	Examination	Deductions of Euclid, Book III., *or* Any Domestic Economy	Transposition from one key to another, *or* from the Imperfect to the Perfect Method	Examination	Deductions of Euclid, Book III., *or* Any Arithmetic	Examination	Euclid, Book II., Props. 1 to 7, *or* Proofs of Arithmetical Rules	Composition on 'Kindness to Animals'	Musical Terms	Examination	Composition on 'He gives twice who gives quickly'

CERTIFICATE ROUTINE FOR JULY, 1893 (MEN AND WOMEN, SECOND YEAR).

CERTIFICATE ROUTINE FOR JULY 1893 (MEN AND WOMEN, SECOND YEAR).

DAYS	FIRST WEEK.			SECOND WEEK.			THIRD WEEK.			FOURTH WEEK.		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	Jevons' Logic, pp. 107 to 122	Read remainder of 'Macbeth,' *or* 'Hamlet'	Euclid, Book VI., first 8 Props., *or* Practise Darning	Formation of Habits and Character	Read Second Half of 'Geraint and Enid,' *or* pp. 26 to 40 of 'Advancement of Learning'	Euclid, Book VI., first 17 Props., *or* Tucking, Whipping, Feather-Stitching	Notes of a Lesson on 'The Thames' to Standard III.	Deductions on Euclid, Book VI., *or* Linen Patch	Paraphrase Lines 72 to 78 of 'Macbeth,' Act V., Scene 2, *or* Lines 38 to 47 of 'Hamlet,' Act V., Scene 2	'Herbert Spencer,' pp. 20 to 38, *or* 'Quick,' Chapter XVI.	Euclid, Book I., *or* Print Patch	Analyse Lines 7 to 20 of 'Macbeth,' Act I., Scene 2, *or* Lines 112 to 125 of 'Hamlet,' Act I., Scene 1. Parse difficult words
TUESDAY	Chief Dates from 1727 to 1775, *or* History from 1485 to 1509	Applications of Cube Root *or* Square Root	As in first Year *or* Geography of England	History from 1727 to 1745, *or* From 1509 to 1530	Discount, Present Worth, etc.	As in First Year, *or* Political Geography of England	Chief Dates from 1775 to 1815, *or* The Fleet from 1485 to 1603	Mental Arithmetic	As in First Year, *or* Geography of New Zealand	History from 1745 to 1760 *or* Writers from 1485 to 1603	Theory of Decimals, especially 'Repeaters'	As in First Year, *or* Climate and Inhabitants of North America
WEDNESDAY	Read 'Macbeth,' Act I., *or* 'Hamlet,' Act I.	Variation and Proportion of Algebra *or* Choice of Food	Physical Geography of China — Maps of Leinster and Munster	Read Notes on Act V., 'Macbeth' *or* 'Hamlet'	Jevons' Logic, pp. 122 to 128	Quadratic Equations, *or* Beverages	Mensuration, *or* Any Revision	'Herbert Spencer,' pp. 1 to 20, *or* 'Quick,' Chapter XIII.	The Algebraic Progressions, *or* Post Office Facilities for Investments	Jevons' Logic, pp. 7 to 22	Logarithms *or* Apportionment of Small Incomes	Any Revision
THURSDAY	History from 1455 to 1509, *or* Dates from 1485 to 1530	Stocks	Grammatical Peculiarities of Shakespeare	History from 1509 to 1558, *or* From 1530 to 1547	Complex Fractions	As in First Year *or* Physical Geography of Australia	History from 1558 to 1625 *or* Great Men from 1485 to 1530	Mensuration *or* Stocks	As in First Year, *or* Map of Leinster and Connaught	History from 1625 to 1660, *or* State Trials from 1485 to 1553	Clock Sums	As in First Year, *or* Political Geography of Australia
FRIDAY	Permutations, *or* Preparation of Food	Euclid, Book III., *or* Diagram of Woman's Night-Dress	Draw up a Routine for a Mixed Half-Time School of 200 average attendance, stating disposition of Teaching Staff	Combinations *or* Food for the Sick	Euclid, Book IV., *or* Cutting-out of a Woman's Night-Dress	Mensuration *or* Any Revision	Binomial Theorem *or* Economy of Food	Deductions on Euclid, Book IV. *or* Diagram of Boy's Shirt	Analyse and Parse difficult words of Lines 64 to 75 of 'Macbeth,' Act V., Scene 8, *or* Lines 398 to 406 of 'Hamlet,' Act V., Scene 2	Binomial Theorem *or* Dietaries	Deductions on Euclid Book III. *or* Cutting-out of Boy's Shirt	Paraphrasing Lines 89 to 99 of 'Macbeth,' Act I., Scene 3, *or* Lines 196 to 207 of 'Hamlet,' Act I., Scene 2
SATURDAY.	Major and Minor Modes	Examination	Describe the characters of Macduff *or* Horatio	Ordinary Musical Measures	Grammar of 'Macbeth' and 'Hamlet'	Historical Dates *or* Any Arithmetic	Repetition, Literature, and Penmanship	Diatonic and Chromatic Intervals	Lives of Great Men	Examination	Accent, Syncopation, and Musical Terms	Mensuration *or* Any Revision	Mental Arithmetic	Repetition, Literature, and Penmanship

16. (*Men only.*) As in First Year.

(*Women only.*) Name any filters you may be acquainted with for purifying water. Describe the one you think best, and state its cost.

17. (*Men only.*) The base of a certain prism is a regular hexagon. Every edge of the prism measures 1 foot. Find its volume.

Ans. 2·598 c. ft.

(*Women only.*) How would you conduct a Cookery Class? How can the dishes when cooked be most advantageously used?

18. (*Men only.*) In how many years will £1,000 amount to £1,800 at 5 per cent. comp. int.? Ans. 12 years nearly.

(*Women only.*) Describe the process of vaccination. On what grounds do some people object to its efficacy?

19. (*Men only.*) Show that the coefficient of the r^{th} term from the end of the expansion of $(x+a)^n$ is identical with the coefficient of the r^{th} term from the beginning.

Find the coefficient of the 109th term of $(a+3b)^{111}$.

Ans. 5080005.

(*Women only.*) What facilities are offered by the Government to small investors in order to induce them to save? Describe one of them.

20. (*Men only.*) Write out Euclid IV., 10.

In the figure show that there are two triangles which fulfil the required conditions?

(*Women only.*) Write Notes of a Lesson on the Choice of a Dwelling.

21. (*Men only.*) Write out Euclid VI. A.

Employ this proposition to prove that if two exterior angles of a triangle be bisected, and the point of intersection of the bisectors be joined to the opposite angle, the straight line so drawn shall bisect that angle.

CORRESPONDENCE.

We shall be pleased to reply briefly through these columns to any SUBSCRIBER *seeking examinational information or advice, and* ENCLOSING THE NECESSARY COUPON.

This privilege does not, of course, extend to furnishing the solutions and answers of problems. All such communications should be addressed to 'THE QUERY EDITOR.'

Replies demanding urgency will be promptly forwarded per post on the receipt of a stamped and addressed envelope, ACCOMPANIED BY THE REQUISITE COUPON.

A post will be saved by writing to DR. GEORGE BEACH, M.A. (*Examination Editor of 'Practical Teacher'*), STANLEY MOUNT, MACCLESFIELD.

ANSWERED PER ORDINARY POST.

G. R. (Bolton), J. H. (Stockport), R. W. (Tamworth), M. P. (Newcastle-under-Lyme), A. L. S. (Ryde), A. S. (Tranmere), F. C. K. (Streatham Hill), E. J. S. (Macclesfield), E. J. R. (Chelford), E. T. (Gosport), W. K. (Edinburgh), W. W. B. (Crewe), F. M. (Kensington), K. K. (West Bromwich), H. H. A. (Knutton), C. S. (Oldbury), E. S. (Herne Bay), A. H. (Holmes Chapel), H. D. (Chesterton), A. H. (Dover), A. P. (Trinity College, Dublin), R. R. (West Bromwich), R. T. J. (Holyhead), J. M. (Manchester), F. W. (West Bromwich), H. F. (Macclesfield), T. H. (Bollington), A. A. P. (Aldbourne), G. L. (Borley), D. J. (Bethesda), V. J. F. (Birkenhead), S. H. (Fenton), E. L. (Congleton), R. H. S. (Durham), M. F. (Rochford), G. W. P. (Tredworth), J. B. S. (Upper Clapton), W. J. L. (Wick), S. K. (Dewsbury), H. W. B. (Alnwick), W. W. (Barby), T. B. E. (Luton), H. L. C. (Grandborough), C. H. B. (Upton), A. B. (Newcastle), J. M. (Spennymoor), E. S. M. (Earl's Barton), two letters; G. H. (Newcastle, Staffs.), H. A. (Attleboro'), W. C. B. (Stockton-on-Tees), OMEGA (Shipley), H. S. (South Lambeth), F. J. M. D. (Liscard), W. M. Q. (Newcastle-on-Tyne), A. S. (Tranmere), J. H. (Stockport), F. S. (Newington), J. T. (Claughton-on-Brock), MARY (Chadderton).

A. M. C. (King's Cross).—Crowded out this month. Will deal with it in August issue.

L. P. (Denbigh), A. S. (Chester).—See this month's Scholarship article. Abbreviations of not less than three letters are allowed in parsing. The passes for Drawing and Science, whenever obtained, will, for this year, be reckoned.

AVIS (——). (1) Ferguson, and (2) Guthrie, obtainable from any scholastic stationer's.

N. E. D. (Winchcombe).—Freehand, Model, Geometry, Perspective.

F. N. (Stourbridge).—For Classical Atlas, see Article.

PAPERS FOR PUPIL TEACHERS.

BY JOHN ADAMS, M.A., B.SC., F.C.P., ETC.
Principal, Free Church Training College, Aberdeen.

PUPIL TEACHERS AND POINTERS.

EVERY well-trained child has been taught that it is 'bad manners' to point, and so it is—for everybody but pupil teachers. Pointing seems to be their chief business.

A pupil teacher without a pointer is like a soldier without his gun; a judge without his wig is not more helpless.

It does not need to be a genuine pointer; anything will do—anything, from a log rescued from the morning fire, through straight-edges of various sizes, down to a 'Cumberland Giant' pencil, or even to a well-worn pencil stump.

Anything will do, we say; but pupil teachers have their preferences, for all that. Any pointer pleases a girl, but, for choice, let her have a dainty, tapering, 18-inch affair, like a conductor's baton.

Then watch her using it, and the display she makes will more than repay any trifling outlay the pointer may have involved. First she scratches the tip of her ear with it. Then she passes it within her elbows and behind her back, and uses it to straighten herself up. Suddenly she whips it out with a mysteriously swift motion, describes a complete circle in the air, and levels it with such an unerring 'thou-art-the-man' style of aim that the culprit feels it to be useless, in this case at least, to look with innocent inquiry at his two neighbours; he gives himself up for lost, and duly 'takes the floor.'

A boy's preference is different. A ruler is what he yearns for. Any ruler will do; but, if you wish to give him lasting satisfaction, let it be a black ruler, and a heavy one. Its length is not material, but it would be better to be long enough to reach his shoulder comfortably without bringing his hand too close to his chin.

Now watch him as he marches up and down before his class, lustily thumping his own right shoulder, and occasionally passing the ruler over his shoulder altogether, to give himself a blow or two on the back. Meanwhile, the youngsters gaze in open-mouthed horror at this lavish display of specimens of the awful blows that may come their way.

Seeing a strapping lad striding thus up and down, with his bludgeon over his shoulder, before a class of trembling seven-year-olds, one cannot help thinking that the little ones hear, in imagination, the dreadful words, 'Fee, Fo, Fi, Fum,' and are wondering how the blood of an Englishman really does smell.

Sometimes the pupil teacher varies the parts of his body, hitting now his back, now his thigh, and occasionally even (at great personal inconvenience) his calf. But he is grandest when he emphasises points by bringing down the ruler with a smack into his rounded left palm—one smack per point, with two smacks for the important ones.

Other and sleepier pupil teachers content themselves with sucking their pointers, which, if not nutritious, seem to be, like somebody's cocoa, 'grateful, comforting.' Others use them as walking sticks, or, if too long for that, then as the drum-major uses his official staff. This last method is very effective.

Others amuse themselves by seeing how far up their sleeve they can shove the pointer, and then how suddenly and unexpectedly they can dart it forth again. (The pupils do not like this game.) There is really no end to the pleasant uses an enterprising pupil teacher can make of any kind of pointer.

If it were not that I am very unwilling to do anything to make the pupil teacher's lot any harder than it is at present, I would write a school comedietta, called *The Pupil Teacher's Delight*—with pointer drill instead of a ballet.

Ill-natured people say that this love of pointers arises directly out of the depravity of pupil teachers, and their inborn love of cruelty. They compare the pointer to the slave-driver's stick; and even people who are not ill-natured must admit that it is a great temptation in the hands of a poor wearied pupil teacher, when his class is tired like himself, after a hard day's work. What is more natural than to try whether the pointer cannot, according to Hudibras:

> 'Mend the gross mistakes of Nature,
> And put new life into dull matter.'

This temptation is the first and a very important reason why pupil teachers should be discouraged in the use of pointers.

Others try to explain the love of pointers on the ground of their symbolic meaning. They are like the general's truncheon or the king's sceptre. Deprived of his staff of office, the poor pupil teacher feels like a soldier out of uniform, or, worse, like a policeman off his beat. He is a mere private person.

But the real reason of this yearning for pointers is that the pupil teacher does not know exactly what to do with his hands. He is inclined to favour a new reading of Doctor Watts:

> 'For Satan finds some mischief still
> For *empty* hands to do.'

Everybody knows that most girls, and *all* boys, between the ages of 14 and 18 (and sometimes long after: but let that pass) have more hands than they know what to do with. Since these ages exactly cover the period of pupil teachership, there can no longer be any mystery about the origin of the love of pointers.

Some objectors want to know why it is, then, that girls are not quite so bad about their hands as boys. The answer is easy. If girls had as many and as convenient pockets as boys, they would soon be as clumsy. They are only a little smarter because they must. They have no place to put their hands, so they *have* to learn a little how to keep them out of mischief. Every Head Master would like to get all the pockets of his pupil teacher boys sewed up. Everybody knows that our soldiers are the smartest men you will see anywhere. Well, *they have no pockets*.

Take away pointers and pockets, and how much of our pupil teacher have we left? Watch him as he stands uneasily before his class. He has five favourite positions.

The first may be called the *Colossus of Rhodes*. He stands with his legs wide apart like that famous brazen statue under which ships used to sail, or, better, like Gulliver when he had that grand Liliputian procession between his legs.

The second position is more elegant, though its name does not sound so well. This is the *teapot* position. The left hand rests upon the thigh, thus representing the handle; the right hand is stretched forth in oratorical fashion, and represents the spout.

The Napoleonic pose is not unpopular. It is very easy, and not ineffective. All you have to do is to pull down your brows, and fold your arms, and stand quite still.

Many pupil teachers cannot stand still, so the Napoleonic pose is not quite so easy as it seems. Those more active spirits practise what we used to call the *pupil teacher's prowl*. If you want to know how to do it, spend an afternoon in the house marked 'Hyænas' in the Zoological gardens, and follow the model there set.

The next is an essentially masculine position. We used to call it 'the sparrow.' All you have to do is to bend the body slightly forward, gather up your coat tails, and insert your hands under them. For obvious reasons this is a position largely confined to 'Fourth Year's.' Others have a little difficulty in finding hiding for the hands.

To balance this masculine position, we have another specially favoured by the girls. To be sure, here as elsewhere, the boys can trench on the girls' preserves, but not the girls on the boys'. For a girl's pose, it is not well named. It is called 'the wine jar.' Our name for it was 'Madame Angot,' from pictures (of a popular opera) that used to cover the advertisement boarding. Our master called it the 'amphora,' which may be freely translated the wine jar. It is very simple. You just stand straight up, and stick the elbows out, while the hands rest on the thigh bones.

When all these positions have been named, and condemned, the pupil teacher may well ask in despair, 'How am I to stand, then, without laying myself open to ridicule?' This, at any rate, was what we used to ask ourselves. The answer is: to be interested in your work, and the pose will look after itself. It is only because these positions we have been speaking of began in deliberate attempts at 'effect' that they are wrong. A pupil teacher before a class has no time to think of effect. If he teaches well, he will naturally bear himself—I do not say 'elegantly': we can do without that—as a teacher should.

Pupil teachers, as a rule, like definite instructions, and all we have said does not supply one 'rule.' Now our grand 'rule,' and a very good one, too, was to stand where you could see the whole class at once: that is, at the 'apex of the equilateral triangle of which the front bench of your class is the base.' This does not mean what we at first thought. It does not mean that you are to be glued to one spot. You can move backwards and forwards as you may see fit (only do not let your motion degenerate into the 'prowl'), keeping always the same distance from your class.

If you do this, I really do not see any necessity for taking away your beloved pointer. Let it be a real pointer, though—not a ruler, or a club—and make it your boast that you have never broken a pointer. Other things being equal, I should always give the preference to a candidate for any appointment who had it recorded in his testimonials that '*he never broke a pointer*.'

Another simple rule—all really good rules are very simple—remember that a pointer is a thing to point with. That's all.

Naturally you cannot stand at equilateral-triangle range from your class all day. Certain subjects require close quarters. But such subjects do not require a pointer. In examining slates or copies a pointer is only in the way. At such times let it lie in your desk. It is no use saying the Lord's prayer every morning if you come among stupid or ill-behaved boys with a pointer.

NOTES AND NOTIONS.

BY RICHARD WADDINGTON.

Ex-President of the Half-Time Council of Teachers.

The most important document issued from Whitehall since Mr. Acland's advent is the Evening Continuation School Code. The regulations for the future guidance of the evening school are marked by an elasticity and freedom that I would fain see incorporated in the Code for day schools. Two points of vast importance are conceded: the abolition of the fixed annual examination, and the payment for individual passes. In neither of these two reforms does the Code go far enough to ensure its success. The anomaly of a variable grant will be intensified under a scheme of intermittent inspection. Nothing is more necessary than a very loud protest against the retention of a variable grant after the abolition of the annual show day. Applied to our primary day schools the scheme of inspection and assessment would produce greater injury to education than the system at present in vogue.

* * * * *

The inspector is to visit the school at any period of the year. The work will be in a state of transition, and the present race of inspectors have been accustomed to prepared exhibitions. It is only necessary that the inspector should examine two of the five subjects that may be taken, and on the estimate of those two is to depend the variable grant for the whole five. Now I can imagine inspectors coming in and examining, say, in English and mechanics, the two subjects on which they are 'faddy,' and awarding the lower grant. The teacher will have no data on which to appeal to the Department, if the Department is prepared to hear the appeal. Many of the inspectors have been reared on 'noughts and crosses,' and will find the new circumstances extremely difficult to interpret. And I can imagine a year's experience of intermittent inspection, coupled with the absurdity of a variable grant, so aggravating the teachers and managers as to produce such a revulsion of feeling on the question of intermittent inspection that would do much to make the abolition of the annual show impossible for many years.

* * * * *

There are other points of great import in the admirable Code just issued. Teachers would do well to seriously consider whether the principle of equal payment, regardless of the extent of the curriculum, could be applied to the day schools. But there is one feature of the Code very much to be deprecated. Evening schools must be attractive, and to become attractive the time-table must provide recreative lessons. Under the new Code this can be done, but the time will not count for payment even for the fixed grant. I hope this will be remedied at once, for very much of the success of the experiment depends on the elasticity of the curriculum, and it will be a pity if so generously conceived a Code is not successful because the regulations make it of interest to the managers to omit recreation.

* * * * *

In the North of England Scotch drapers canvass for orders for clothing from house to house, and the clothing is supplied on the 'easy payment system.' The other day the master of a large school in the North, on entering a class-room where the third standard was taking a geography lesson, found the assistant 'doubled' while getting rid of a deep chuckle, and the children convulsed. The master, wishing to join the merriment, asked, 'What is the matter?'

Teacher.—'Johnny ——— says that a Scotchman is a man that travels with a pack!'

* * * * *

On Saturday last the teachers of Salford, Farnworth, and Bolton met to celebrate the appointment of their late sub-inspector, Mr. W. Northrop, to the inspectorate. I confess I do not like testimonials to inspectors, but teachers would have been untrue to themselves if they had not signalised Mr. Acland's last step towards an open inspectorate. Mr. Northrop was very candid in his reply. His present position was due to the work of the National Union of Teachers. There was a ring of confidence about the meeting that would have convinced Mr. Acland that he need have no fear in filling up the inspectorial rank from the 'knights of the chalk and duster.'

* * * * *

Mr. Dawkins, the President of the Salford Association, read a very interesting extract from a Blue Book of 1840:—

'In one dame-school I found thirty-one children from two to seven years of age. The room was a cellar 10 feet square and about 7 feet high. The only window was less than 18 inches square, and not made to open. Although it was a warm day towards the close of August, there was a fire burning, and the door, through which alone any air could be admitted, was shut. The damp subterraneous walls of the cellar required, as the old woman assured us, a fire throughout the year. If she opened the door the children would rush out to light and liberty, while the cold blast rushing in would torment her aged bones with rheumatism. Still further to restrain their vagrant propensities, and to save them from the danger of tumbling into the fire, she had crammed the children as closely as possible into a dark corner at the foot of her bed. Here they sat in the pestiferous obscurity, totally destitute of books, and without light enough to read had the books been placed in their hands. Six children, indeed, out of the thirty had brought some twopenny books; but these also having been made to circulate through sixty little hands, were now so well soiled and tattered as to be rather the memorials of past achievements than means of leading the children to fresh exertion. The only remaining instruments of instruction possessed by the dame, who lamented her hard lot to be obliged at so advanced an age to tenant a damp cellar, and to raise the means of paying her rent by such scholastic toils, were a glass full of sugarplums near the tattered leaves on the table in the centre of the room, and a cane by its side, every part of instruction being thus secured by the good old rule of mingling the useful with the sweet.'

* * * * *

The Department has modified the alteration in the last Code by which candidates for the scholarship examination could only count marks for success in science at the previous May examinations. The alteration extends the period to the fourteen months before the July of the examination. On what ground this uneducational regulation was first made I am not aware, but I am certain the Department would have acted more wisely in resorting to the old arrangement for the present. I am looking forward to an entire

remodelling of Schedule V., wherein yearly success in science and drawing will be credited at each yearly examination.

* * * * *

And this brings me to the necessity of an annual examination of pupil teachers. It will be remembered that the abortive Code of Sir W. Hart-Dyke provided for a biennial examination. Is there any reason against this? A pupil teacher might be examined at entrance, and at the end of the second and fourth years. The examination at the end of the second year might be conducted like the scholarship examination, and extend over the same period. By this means hundreds of young people would turn their attention to some other employment ere they passed from boyhood or girlhood. The pupil teachers would have an opportunity of doing themselves justice, which they do not now possess, with only one day for the examination; and the mental strain on the young boy or girl would be decreased.

* * * * *

To accomplish this all indentures would end with the civil year. I can see no serious objection to this. It would make it possible to arrange all pupil teachers as seniors or juniors, and this would facilitate the simultaneous teaching of all pupil teachers on the lines I suggested in these columns a year ago. The list for the juniors could be in order of merit, just as the scholarship list, and this would be a boon to the teacher, because the pupil teachers would measure their mental prowess before the end of their apprenticeship.

* * * * *

Since my last, two conferences on matters educational have met—the Church Teachers and Managers', and the School Board Clerks'. Judged by the educational views expressed, the order would be inverted. On the question of corporal punishment the opinions expressed by the School Board Clerks were quite refreshing. But the most retrogressive of all the suggestions was that of Mr. G. B. Davis, in dealing with the vexed question of school exemption. To find the Clerk of an important School Board like Birmingham suggesting that 'age only' should be the qualification, and that the ages should be eleven for half time and fourteen for full time, makes me utter,

> 'Tis strange—but true! for truth is always strange,
> Stranger than fiction.'

To find a gentleman who is supposed to be anxious to extend education advocating that every child may become a half-timer at eleven years of age, regardless of physical or mental fitness, is so strange that I feel sure Mr. Davis has no acquaintance with the genuine half-timer.

* * * * *

What would be the result of the adoption of this suggestion? From the 'Annual Return' issued by the Education Department I find that the number of children over eleven years of age attending our primary schools reached 1,109,173, and every one of these would be entitled to attend school half time. The adoption of Mr. Davis's suggestion would increase the number of half-timers from 172,363 to 1,109,173. But the mischief would not end here. The local authority could only enforce half-time attendance after the child had reached eleven, and every school, nay, every class, would contain more or less half-timers. Mr. Davis would allow no inquiry beyond the certificate of birth—the child might roll in the gutter, or make mud pies, for one-half of its school career. I would ask the advocates of 'age only,' 'Is this the solution you desire to bring about?'

* * * * *

While I am on this vexed question of exemption, let me reiterate the N.U.T. policy. No half time before twelve years of age, and only then if the poverty of the parent necessitates it. The child must be 'necessarily and beneficially employed,' and the attendance must be mornings one week and afternoons the next. Is there any educationist who hesitates to endorse this policy? Still further to secure an educational proficiency before entry on the labour market, the child must show a record of attendance since the fifth birthday. Why, the policy advocated by the Clerk to the Birmingham School Board is as uneducational as it is simple.

* * * * *

I was pleased to see the question of the penny-bank brought to the front. Under many School Boards the craze is taking the head-teacher from the class-room for four or five hours a week. Nothing is too great to sacrifice in the interest of so-called 'thrift.' If there must be a system of banking in our schools, why not accept the offers of the Post Office and let them send a clerk to take care of the clerical work of the penny bank? It will be a paying concern in the hands of the Post Office, but, if the teacher is to devote Monday to the penny-bank, then why not only open school on that day to bankers. Too often the virtue runs to vice, to enable some official to boast of the number of depositors and the amount invested. No mention is made of the weary hours spent by the teacher at home, previous to the audit, squaring up the accounts; or of the lessons neglected because of the sitting at the 'receipt of customs,' gathering in the nimble penny.

SKETCHES OF MODERN EDUCATIONAL REFORMERS.

V.—THRING OF UPPINGHAM.

Education is not cram: but character.

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.)
Author of 'Mental Science and Logic for Teachers.' Co-Director of the Birkbeck Training Classes and Lecturer therein on School Method.

Many years ago chance put the writer in possession of a book replete with pedagogic lore, and teeming with suggestiveness. It was 'Education and School,' by the Rev. Edward Thring, M.A., Head Master of Uppingham School. Subsequent reflection, and the perusal of other works from the same pen, have only added to the admiration which was evoked by the masterpiece referred to, and with satisfaction it is that we have viewed the growing popularity of Thring's works. More than one primary teacher has received his 'living fire' from this same source; one in particular, now holding, and gracing one of the highest offices of the N.U.T., after a successful career as a school teacher, would be proud to confess his indebtedness to the Master of Uppingham for inspiration which contributed, in no small mea-

sure, to his success. Interest, therefore, in our Reformer of to-day will scarcely be altogether wanting.

Born in 1821, Edward Thring was the third son of the Rev. J. D. Thring, who fulfilled the double *rôle* of Squire and Rector of Alford-with-Hornblotton, Castle Cary, Somersetshire. His connections were instinct with culture, his mother being the daughter of the Rev. J. Jenkyns, vicar of Lowercreech, and sister of Dr. Jenkyns, Master of Balliol. Lord Thring—raised to the peerage in 1886 on account of his services as Chief Draughtsman of Parliamentary Bills—and the Rev. Godfrey Thring, in his turn also rector of Alford, were his elder brothers. As a boy he attended the Ilminster School, passing to Eton in 1832. 'If you want to tell a lie, do it yourself,' was an expression which showed, even at this early period, how doggedly his face was set against deceit; and the sobriquet of 'Die First,' which was given to him by his fellow Etonians on his refusal to admit his inferiority at 'fives,' by leaving the court to older and, in their estimation, more skilful comrades, indicates that stern determination which was one of the man's chief characteristics in after life. Those acquainted with the traditions of the great public school of which he became Captain will be interested in learning that the future *beau sabreur* of matters educational was the last of the Montems, whose wont it was on Whit-Tuesday to stand upon a certain eminence, and demand of passers-by the wherewithal to support the Senior Scholars of the School at the Universities. In due course the future Master passed to King's College, Cambridge, becoming in 1843 Porson Prizeman, and taking the B.A. Degree in 1844, the M.A. in 1847.

His attempt to obtain an Assistantship at Eton was unsuccessful, and a like fate was meted out to him when aspiring to the Head-Mastership of Durham Grammar School, wherefore he became curate at St. James's, Gloucester, but ill-health made him resign this post, and take duty with his father at Alford. This was in 1847. Two years later we find him combining private tuition with a curacy at Great Marlow, and from 1850–51 he was engaged in similar work at Cookham Dean. On the 10th September 1853 came the great opportunity, for on this day he was appointed Head Master of Uppingham, then an insignificant private school, with a single boarding house, 43 boarders, 18 day scholars, and an usher as sole assistant.

At his death, on October 22nd, 1887, Uppingham was one of the great public schools of England, comprising the great school, school chapel, sanatorium, gymnasium, forge, workshops, swimming bath, 11 boarding houses, a preparatory school, 12 fives courts, 2 cricket grounds, an aviary and public garden, together with 10 acres of land for school purposes; a noble monument, surely, to the professional skill and indomitable energy of 'Teddy,' as the boys delighted to call him. But this was not all, for £25,000 had been added to the school trust. Indubitably, therefore, Thring had earned the title of greatest public-school Master since Arnold. Where did his right hand get this cunning? In his own opinion the best training for his mastership had been received *in the parish schools of Gloucester and Alford.* To this must be added his native ability and genius, for of the schoolmaster as of the poet it can truly be said, *nascitur, non fit.* His interest in elementary education was always keen, as will be seen from his writings. On December 20th, 1853, he took to wife Fraulein C. Marie Koch, a cultured German lady whom he had met at Rome. This lady was, as he said in dedicating his 'Theory and Practice of Teaching' to her, 'my partner in school-life, to whose courage and help I owe so much of life, and of work done.'

Wherever the name of Thring is mentioned will be told the tale of how they brought the big school from Uppingham to Borth. The matter was on this wise: Typhoid fever, undoubtedly due to the defective drainage of the town, seized the school in its fell clutches. The scholars were sent home, and returning after an interval, were again overtaken by the scourge. Despairing of the application of those drastic remedies which alone could lay the grim spectre, by reason of the dilatoriness, and even hostility, of the municipal authorities, and justly fearing that his herculean efforts during upwards of 20 years would be rendered futile, and his school ruined, 'Die First' dismissed his scholars, with orders to reassemble in three weeks' time at Borth, on Cardigan Bay. During these three weeks his determination and powers of organising were most conspicuous, and the boys were duly received at the appointed time in the improvised school on the Welsh coast, and Uppingham was by the sea for a year. Upon his return Thring received an ovation; he was made President of the Uppingham Mutual Improvement Society, and did much to make it a success. With his accustomed common sense he anticipated much that is now being done by the various County Council Technical Committees. Cookery was taken especially under his wing. 'If,' said he, 'the husband is the bread-winner, the wife ought not to be the bread-waster.'

His schoolroom was adorned with paintings of the great masters of literature, and in other ways was embellished and made unusually attractive. Said a visitor, 'The worthies of literature look down as with the eyes of ancestors on Uppingham scholars.' 'I do not see,' responded the Master, 'why education should be associated with grimness or roughness, with bare walls or inkstains.'

His policy was ably and tersely summed up by the writer of his obituary notice in the 'Globe':

'Mr. Thring preached, and practised, that freedom from traditional, or officially imposed, methods of teaching alone could enable schools and schoolboys to make the best of one another. And we have every confidence that this principle will ultimately prevail in generations more fortunate than these.' Such freedom we are beginning to taste, and it is to such men as Thring and Quick that we are greatly indebted for the healthy direction which public opinion on educational matters is beginning to exhibit an inclination to take. In these days when we are expecting that the Annual Show Day will, in a year or so, be a thing of the past, we shall read with approval what this reformer has to say on the subject of Inspection and Inspectors:

'The Inspector destroys teaching because he is bound by law and necessity to examine according to a given pattern: and the perfection of teaching is that it does not work on a given pattern. *Minds cannot be inspected.*'

And again: 'Most examiners are young, and are sent fresh from their books and their laurels to pass

judgment on what they have not been accustomed to, and tabulate the lifelong labours of men who, having been their equals in intellectual honours twenty, thirty, or forty years before, have added since the experience of successful work during those years to this early success in bookwork. *If books are the work of life, this is not incorrect; but if teaching mind is the work of life, it is destruction.* . . . If memory, rules, and neatly packed knowledge make men, up with the flag, enlist our workers under the banner of examinations. But if education and training are the true aim of mankind, and power in man's self the prize of life, then no superstition ever ate into a healthy national organism more fatal than the cult of the examiner.' A heavy indictment, verily, to hurl at a system, and as true as it is heavy. In like manner does Thring with scathing irony and epigrammatic satire lay bare many other of the fallacies which have retarded, and are retarding, the adequate development of our children's minds. Let the London School Board carefully con the following, and then say whether their recent howl of triumph is not utterly discreditable :

'A lecturer can lecture to 100, 200—any reasonable number of hundreds in one hour. They all hear him, and that is what they have to do. *A teacher can teach twenty-five at the outside* in the same time. This decides the question of cost. If 100 is taken as a low estimate of a possible audience, and twenty-five as the maximum of a class, then the cost to each hearer of a lecturer is one quarter the cost of a teacher.' In a word, the salary of a teacher should be four times greater than that of a lecturer. How many teachers are compelled to become mere lecturers by sheer force of the excessive size of their classes! As for corporal punishment, he tells us, in 'Education and School,' that 'the common argument that flogging is a degrading punishment to boys *will not bear investigation.* Either it is degrading in itself, or degrading on account of the circumstances attending it. If received for gross offence, a flogging is obviously degrading, but then *it is the offence which degrades, not the punishment.* This is a distinction often lost sight of: *as if disgrace consisted in being found out and punished, and not rather in deserving punishment.* In this connection we may refer to a somewhat amusing incident. The boys had been warned that those who returned late, after a certain vacation, would be punished. Several boys missed their trains (in all probability wilfully), and Thring kept his word, whereupon arose a great outcry, which was taken up by the sickly sentimental part of the press, and the usual mawkish drivel was perpetrated. 'Punch,' however, contented himself with the following *mot*: *'We don't know whether Mr. Thring trains the boys' minds, but he makes them mind their trains.'* By the boys themselves the complainants were promptly sent to Coventry, their opinion, as is usual on this subject, being devoid of that invertebrateness which is sometimes exhibited by their elders.

Most firmly does he insist upon a healthy public opinion in his school. His favourite argument was that vice can only exist in a community which tolerates, and therefore, by implication, participates in it. Hence the boys were put on their mettle to chase evil-doing from their midst, and it is said by Mr. Skrine, to whose 'Memory of Thring' we are indebted, that no master was more successful in putting down boyish immorality, and no master turned out a greater proportion of boys with sound characters than Thring. This is the opinion of a man who was at Uppingham as pupil and master for twenty-one years. The same authority asserts that 'had Mr. Thring's commanding talents and matchless energy been employed in any other branch of the public service, he would by this time be a man whom his country had delighted to honour.' Here Mr. Skrine only expresses a truth that the inspectorate appointments drive home to us with increasing force, viz., that the schoolmaster may indeed bear the burden and heat of the day, but *honours are not for him.*

Another pupil writes that Thring was full of enthusiasm for honour and purity. To him we may apply the words which Tennyson puts into the mouth of Gareth :

> 'Live pure, speak true, right wrong, honour the king,
> Else wherefore born?'

He was resolved on trusting his boys and on the abolition of school loafers. Every boy, was his theory, is good for something, and it is the master's duty to find out what this is, and *to assist the boy to be something.* Evoke the spirit of belief in self, and respect for self, was with him a cardinal rule, and it would be difficult to find a nobler one. Another writer (Miss Beale) gave it as her opinion, from personal observation, that Uppingham was taught on the principle that it matters comparatively little what knowledge is taught. Who are the teachers, is the real question. What the teacher is and how the teaching is done, that is all in all. Not what is taught as much as the spirit in which it is taught makes all the difference: above all, the character of the teacher. Here are a few expressions of what Thring thought a teacher should be.

A teacher has as his subject life and mind.

A teacher's life is in living beings, not in printer's ink.

A teacher is an artificer of mind and noble life.

Above all, a teacher never lets a single life of those put into his hands be spoiled or wasted, or flung aside through neglect and scorn.

A teacher is the helper and friend of the weak.

This is the way he treats Pope's couplet :

> 'A little learning is a dangerous thing;
> Drink deep, or taste not the Pierian spring.'

Common-sensed into plainer English it runs thus :

> 'A little money is a dangerous snare;
> Get thousands, but of sixpences beware.'

Likewise note the ready way in which he stifled an incipient hiss that was due to some unpalatable advice given to his Sixth Form: 'There are just two animals that hiss—the snake and the goose; take your choice, gentlemen!' Their choice was silence, it is needless to add.

To Edward Thring is due the initiation of the Head Masters' Conference and also the establishment of the first Public School Mission in the East End of London.

We conclude this short and necessarily incomplete sketch with a list of our Reformer's works :

'Education and School' (1864).
'Thoughts on Life' (1871).
'Theory and Practice of Teaching' (1883).
'School Sermons.'
'Poems and Translations.'
'Uppingham School Songs.'
'Addresses.'

SPECIMEN MUSIC TESTS FOR PUPIL TEACHERS AND SCHOOLS.

BY W. G. MC.NAUGHT,
Associate of the Royal Academy of Music.

SCHOOL DIVISION IV.—STANDARD V. and upwards.

NEW requirements Education Department:—

SIMPLE TESTS COMBINING TIME AND TUNE WILL BE APPLIED TO DIVISION IV. IN ALL SCHOOLS IN WHICH THE AVERAGE ATTENDANCE OF OLDER SCHOLARS EXCEEDS SIXTY.

School teachers should be careful not to underrate the advance in practical skill demanded by this requirement. It is possible for a class to fluently sing monotone time exercises of some complexity, and to sing tune exercises involving difficult leaps and key changes, and yet not be able to sing at sight the simplest combination of time and tune. The fitting of time and tune should be systematically studied all through the course. In upper classes where the combination has not hitherto been regularly practised, it will be necessary to go through a graded course, based upon the recognition of what experience shows to be easy and difficult in the study. Obviously, exercises or pieces in which leaps have to be sung at sight in divided pulses are found difficult. Leaps from tone to tone of the Doh or key chord, and quick movement, combined with repeated tones and stepwise movement (*i.e.*, to and from notes next to one another in the scale) are fairly easy. Exercises in which a single rhythmic form is applied to varied tonal successions make very good studies (see 13, 14, and 15 below). But school songs and pieces properly taught are after all the pleasantest studies of combined time and tune. It is, however, necessary to use exercises and tests, because by these means difficulties can be introduced one at a time, and the study properly graded.

The double bars show the phrasing of the tests. It is important for classes to endeavour to group notes together properly.

TONIC SOL-FA TESTS.

Continuations, and Repeated Tones in Divided Pulses.

Doh = D.

(1)
d :— | —: m	s :— | s : s.s	l : s	f : m	m :— | r :—
d :— | —: m	s : l | t : d'	m : m.m | m : r	d :— | —:—	

Doh = D.

(2)
d : d.d | m : d	s : s.s | s : s	f :— | m :—	r : d | t_1 : d	
r : r.r | r : r	m : d | s : f	m : s | t_1 :—	d :— | —:—	

Doh = F.

(3)
d :— | t_1 :—	d : d.r | m :—	d : —.r | m : s	d : d.r | m :—	
f :— | m :—	r : r.r | d : m	r : —.r | d : t_1	r :— | d :—	

Doh is G.

(4)
d :— | s_1 :—	l_1 : t_1 | d :—	r :— | —: m	d : d.d | d : d	
r : r.r | r : r	m :— | s :—	s_1 : s_1.s_1 | s_1 : s_1	d : r | m : f	
m : —.r | d : t_1	r : m | f : s	f : —.m | r :—	s :— | s :—	
m : d | s :—	s_1 : l_1 | t_1 : d	m :— | r :—	d :— | —:—	

In Three Pulse Measure, with Rests.

Doh = F.

(5)
d :— : r	m :— : f	s : m : l	r :— :	
m :— :	f :— :	r :— :	d :— :	
r : —.r : r	m : —.m : m	f : —.s : l	l : s : f	
m : —.m : m	f : —.f : f	s : —.f : m	m :— : r	
d : d	s :— :	s_1 : l_1 : t_1	r :— : d	

Divided Pulses, with Stepwise Movement.

Doh = D.

(6)
d : d.r : m.f	s : l : t	d' : s : m	s.f : m.r : d
r : m : d	r : —.m : d	r : r.m : d	m :— : r
d : d'.t : l.s	f.m : r : t	d' : d.r : m.f	s : f.m : r
m : —.f : s	r : —.m : f	d : m : r	d :— : —

Doh = G.

(7)
d : t_1 : l_1	s_1 :— : m	m : r.d : t_1.l_1	l_1 :— : s_1
f : m : r	f : —.m : r	d : d.t_1 : d	r :— | s_1
s : f : m.r	d : t_1 | d	f : m.r : d.t_1	t_1 :— : l_1
l : s : f	f.m : m.r : r.d	s_1 : m : r	d :— : —

Doh = F.

(8)
m : —.f | s : m	d : —.r | m : s	f : m.r | d : r	
m : s_1 | r :—	f : —.s | l : r	m : —.f | s : d	
r : —.m | f : m	r.d : d.t_1 | d :—	s :— | f : m	
l.s : f.m | r.d : t_1	f :— | m : r	s.f : m.r | d.t_1 : d	
s_1 : l_1 | t_1 : d	s_1.l_1 : l_1.t_1 | t_1.d : d	r : m | f.m : r.d	
m :— | r :—	d :— | —:—		

With Easy Leaps in Divided Pulses.

Doh = F.

(9)
d : s.s | m : d	s_1 : s_1 | d :—	d : m.s | s : f	
t_1 : d.r | m :—	s : s_1.s_1 | s :—	m : d.s_1 | l_1 : t_1	
d.s_1 : d.r | m.f : s.f	m.d : r | d :—		

Doh = G.

(10)
d.r : m.f | s.m : d	s_1 : f | f.m : r	s_1 : m | m.r : d	
s : f.m | r :—	r : m.d | r : r	m : s.m | f : f	
l.s : f.m | r.d : t_1.l_1	s_1 : r | d :—		

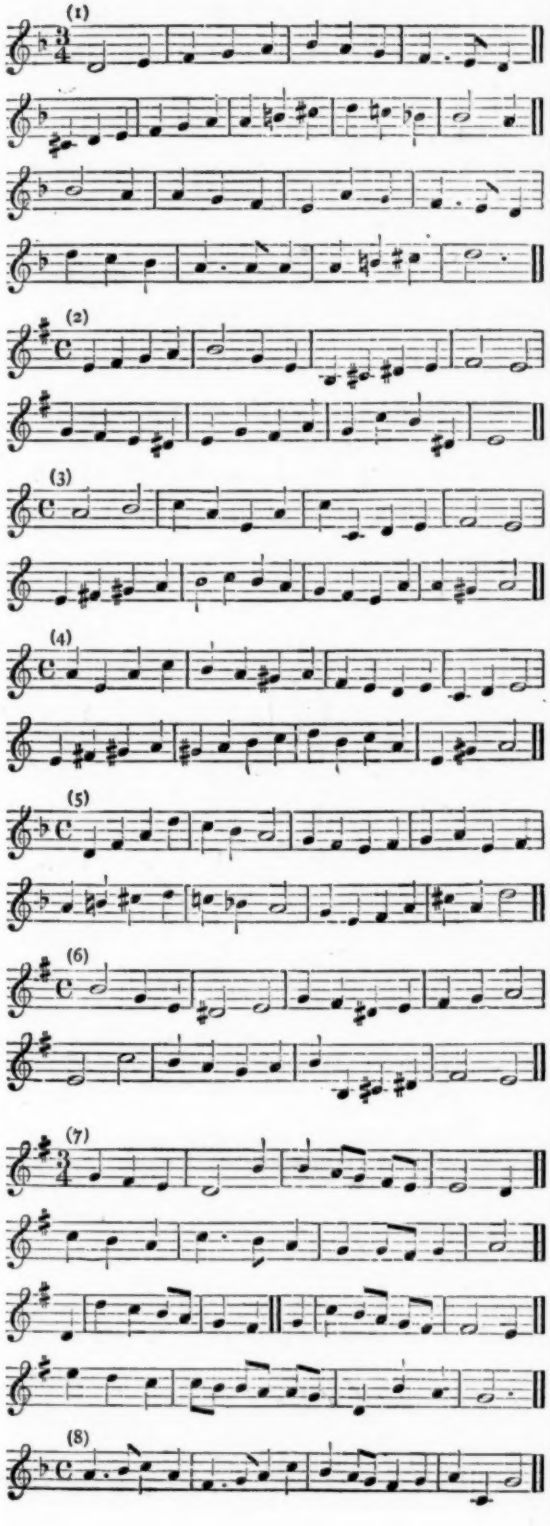
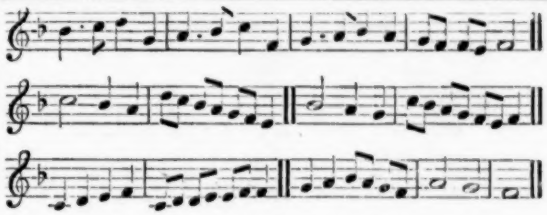
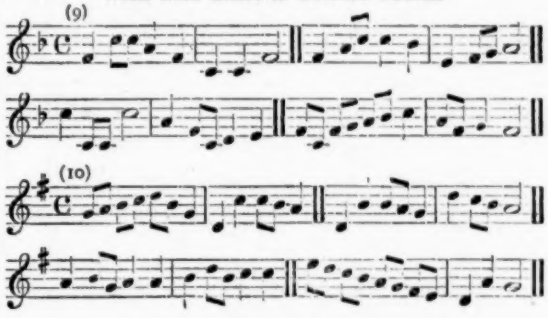
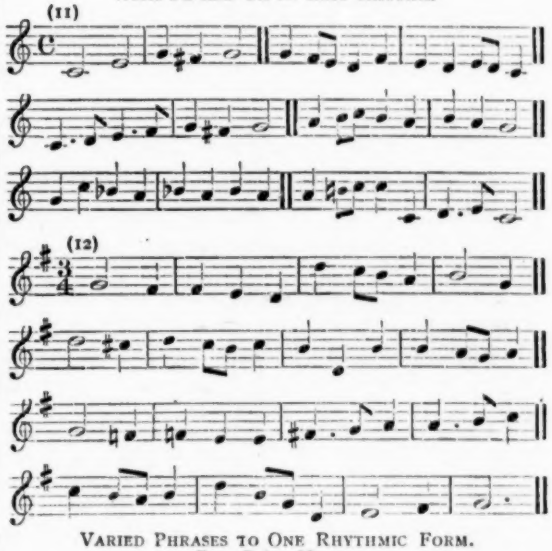
With Fe and Ta in Easy Rhythm.

Doh = C.

(11)
d :— | m :—	s : fe | s :—	s : f.m | r : f	
m : r | m.r : d	d : —.r | m : —.f	s : fe | s :—	
l : t.d' | t : l	t : l | s :—	s : d' | ta : l	
ta : l | ta : l	l : f.d' | d' : d	r : —.m | d :—	

Doh is G.

(12)
d :— : t_1	t_1 : l_1 : s_1	s : f.m : r	m :— : d
s :— : fe	s : f.m : f	m : s_1 : m	m : r.d : r
d :— : ta_1	ta_1 : l_1 : l_1	t_1 : —.d : r	r : —.m : f
f : m.r : m	s : m.d : s_1	l_1 : —: t_1	d :— : —

STAFF NOTATION TESTS.

WITH EASY LEAPS IN DIVIDED PULSES.

WITH FE AND TA IN EASY RHYTHM.

VARIED PHRASES TO ONE RHYTHMIC FORM.

Four Pulse Measure.

(13) Doh = C or D.

(*a*)	d	:	—	d.d	:	d	d	: -.d	d.d	:	d
(*b*)	s	:	—	s.f	:	m	d	: -.r	m.r	:	d
(*c*)	m	:	—	s.d	:	r	f	: -.m	r.m	:	d
(*d*)	s	:	—	f.m	:	r	f	: -.s	m.r	:	d
(*e*)	d	:	—	d'.t	:	l	r	: -.f	m.s	:	d
(*f*)	s	:	—	d.s	:	m	l	: -.s	l.t	:	d'
(*g*)	d'	:	—	d.m	:	s	s	: -.s	t.s	:	d'
(*h*)	m	:	—	s.f	:	m	d	: -.d	m.s	:	d'

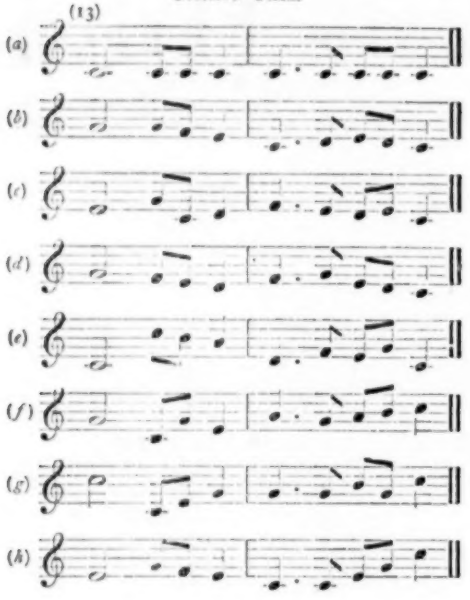
Three Pulse Measure.

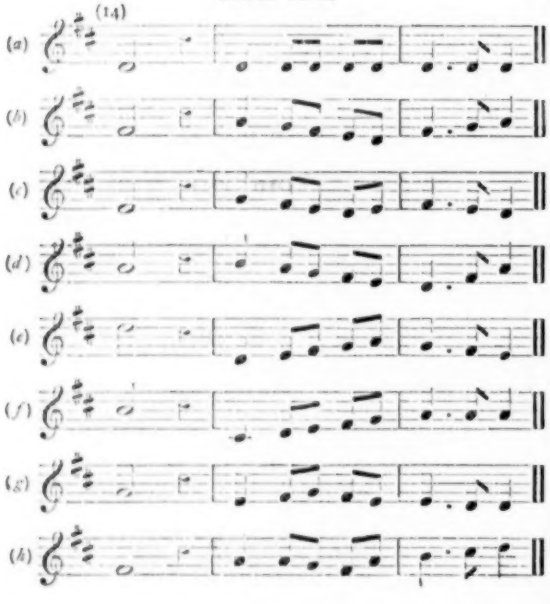
(14) Doh = D.

(*a*)	d	:	—	:	d	:	d.d	:	d.d	d	: -.d	:	d
(*b*)	m	:	—	:	s	:	f.m	:	r.d	m	: -.f	:	s
(*c*)	r	:	—	:	f	:	m.r	:	d.r	m	: -.r	:	d
(*d*)	s	:	—	:	l	:	s.f	:	m.r	d	: -.m	:	s
(*e*)	d'	:	—	:	d	:	r.m	:	f.s	f	: -.m	:	r
(*f*)	l	:	—	:	t_1	:	d.r	:	m.f	s	: -.s	:	s
(*g*)	f	:	—	:	r	:	m.f	:	m.r	r	: -.d	:	d
(*h*)	m	:	—	:	s	:	s.f	:	m.s	l	: -.t	:	d'

STAFF NOTATION TESTS.

COMMON TIME.

(13)

TRIPLE TIME.

(14)

PUPIL TEACHERS' PRACTICAL EXAMINATION.

Tests suitable for second year Pupil Teachers were given in our *December* issue. Third year Pupil Teachers are expected to sing tests, combining the time and tune of the requirements for School, Div. IV. and others founded upon the complete minor scale. The foregoing school tests will therefore afford useful practice for Pupil Teachers. The following tests will illustrate the complete minor scale.

TONIC SOL-FA TESTS.

(1) Lah is D; Doh is F.

$l_1 : - : t_1$	d : r : m	f : m : r	d : -.t_1 : l_1
$se_1 : l_1 : t_1$	d : r : m	m : ba : se	l : s : f
f : — : m	f : — : m	m : r : d	t_1 : m : r
d : -.t_1 : l_1	l : s : f	m : -.m : m	m : ba : se
l : — : —			

Lah is E; Doh is G.

(2)

l_1 : t_1 | d : r	m : — | d : l_1	m_1 : ba_1 | se_1 : l_1	
t_1 : — | l_1 : —	d : t_1 | l_1 : se_1	l : d | t_1 : r	
d : f | m : se_1	l_1 : — | — : —		

Lah is A; Doh is C.

(3)

l : — | t : —	d' : l | m : l	d' : d | r : m	
f : — | m : —	m : ba | se : l	t : d' | t : l	
s : f | m : l	l : se | l : —		

Lah is A; Doh is C.

(4)

l : m | l : d'	t : l | se : l	f : m | r : m	
d : r | m : —	m : ba | se : l	se : l | t : d'	
r' : t | d' : l	m : se | l : —		

Lah is D; Doh is F.

(5)

l_1 : d | m : l	s : f | m : —	r : d | t_1 : d	
r : m | t_1 : d	m : ba | se : l	s : f | m : —	
r : t_1 | d : m	se : m | l : —		

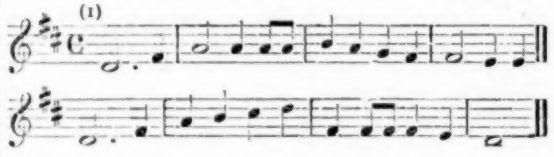
Lah is E; Doh is G.

(6)

m : — | d : l_1	se_1 : — | l_1 : —	d : t_1 | se_1 : l_1	
t_1 : d | r : —	l_1 : — | f : —	m : r | d : r	
m : m_1 | ba : se_1	t_1 : — | l_1 : —		

STAFF NOTATION TESTS.

CONTINUATIONS, AND REPEATED TONES IN DIVIDED BEATS.

(1)

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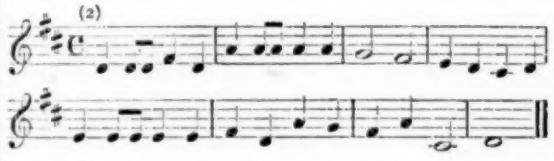
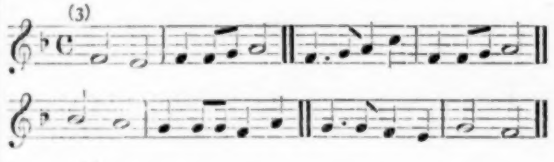

(3)

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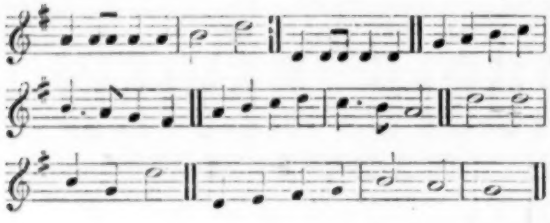
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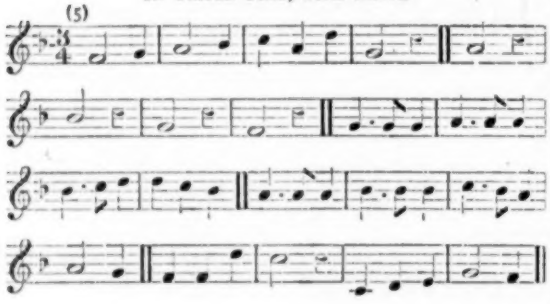
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REVIEWS.

Advanced Physiography. By Richard A. Gregory and J. C. Christie, F.G.S. London: Joseph Hughes and Co.

This is a capital text-book for students of the Advanced Stage of Physiography, according to the Syllabus of the Science and Art Department. Mr. Gregory, who is responsible for the greater part of the volume, is remarkably well-equipped for the task he has undertaken, not only by his successful studies, but by his practical work at the Royal College of Science, South Kensington, and by his experience as a scientific writer and teacher, and as a University Extension lecturer.

In the course of a careful reading of the fifteen chapters of the book, we have been struck by the thoroughness with which each part of the comprehensive subject is treated, and by the fearless spirit in which the most abstruse speculative theories of modern physical science are examined and explained, attacked or defended.

The first chapter deals with the Principles of Light, and gives clear and condensed statements of the different theories of light, followed by the mathematical treatment of the laws of optics, and the practical application of these laws in the phenomena of reflection, refraction, and the construction of lenses, mirrors, and telescopes.

The second chapter is devoted to a descriptive account of astronomical instruments and their use. The instruments described include the theodolite, alt-azimuth instruments, the vernier, the transit instrument, equatorial telescope, and the spectroscope. Excellent illustrations accompany the verbal descriptions. The next two chapters treat, in a very satisfactory manner, of the Solar System and its dimensions. In these, and in the chapters on Motion and Mass and the Moon's Motions, the mathematical portions are very fully and carefully presented. Thus the various means of determining the distance of the celestial bodies by parallax, aberration, and the velocity of light are described in detail. The same remark applies to the determination of the density, mass, and weight of the earth, and the masses of the sun, planets, and some stars. The more subtle movements, called precession, nutation, and libration are explained and illustrated, and also the phenomena of eclipses and tidal motions.

Chapters VIII. to XII. are concerned chiefly with the physical phenomena of the heavenly bodies, one chapter giving an admirable account of celestial chemistry and its development by spectroscopic observation. There is ample evidence in this part of the book that the student may rely on finding in its pages trustworthy information on the most recent phases of physical research. Thus in the chapter on Planets and Satellites we find full references to the opposition of Mars in 1892, on which the remarks of Professor Lockyer are quoted, and the discovery also last year of a fifth satellite of Jupiter by Professor Barnard, using the great Lick telescope. In the chapter on Stars and Nebulæ, we have a long account of the discovery, early in 1892, of the new star in Auriga.

The greatest authorities on physical astronomy are laid under contribution, and the various theories they have advanced—such as Laplace's nebular hypothesis and Lockyer's meteoritic theory—are subjected to careful examination.

The last three chapters, written by Mr. Christie, sum up in a very able manner the most recent observations and conclusions on the geological questions included in Physiography. The chapters are on the Earth as a Cooling Globe, the Interior of the Earth, and Kant's Hypothesis. A large mass of facts is presented, and the arguments for and against certain deductions from them are ably stated. The difficulties of Lord Kelvin's theory that the earth must be a rigid body and not a comparatively thin crust of solid matter enclosing a molten interior mass, are examined and weighed in a truly scientific manner.

A very carefully compiled set of questions is appended to each chapter; many are selected from papers set at the Science and Art examinations in previous years. A serviceable index completes the volume.

We consider the book a decidedly valuable acquisition to the student's library of works on physical science, and a worthy successor and supplement to Mr. Gregory's popular text-book of Elementary Physiography.

The publishers have done their part well in presenting the text in good type, the illustrations, most of which have been specially prepared, with clearness and neat execution, and the whole bound up in a strong and neat cover with suitable emblematic design.

A Primer of Historical English Grammar. By Henry Sweet, M.A., Ph.D., LL.D. Clarendon Press. London: Henry Frowde.

A little work of 112 pages though this be, it is as full of matter as an egg is of meat. It covers exactly the same ground as the Author's 'Short Historical English Grammar,' with the addition of a short selection of Old, Middle, and Modern English Texts, to which are appended very lucid, if brief, grammatical notes. Studied in connection with such little, though excellent, books as Earle's 'Anglo-Saxon Primer,' and Wyatt's 'Notabilia of Anglo-Saxon Grammar,' a very sound elementary knowledge, not only of Anglo-Saxon, is attainable, but also a reliable acquaintance with the different processes in the development of Modern English from its ruder yet more inflected parent.

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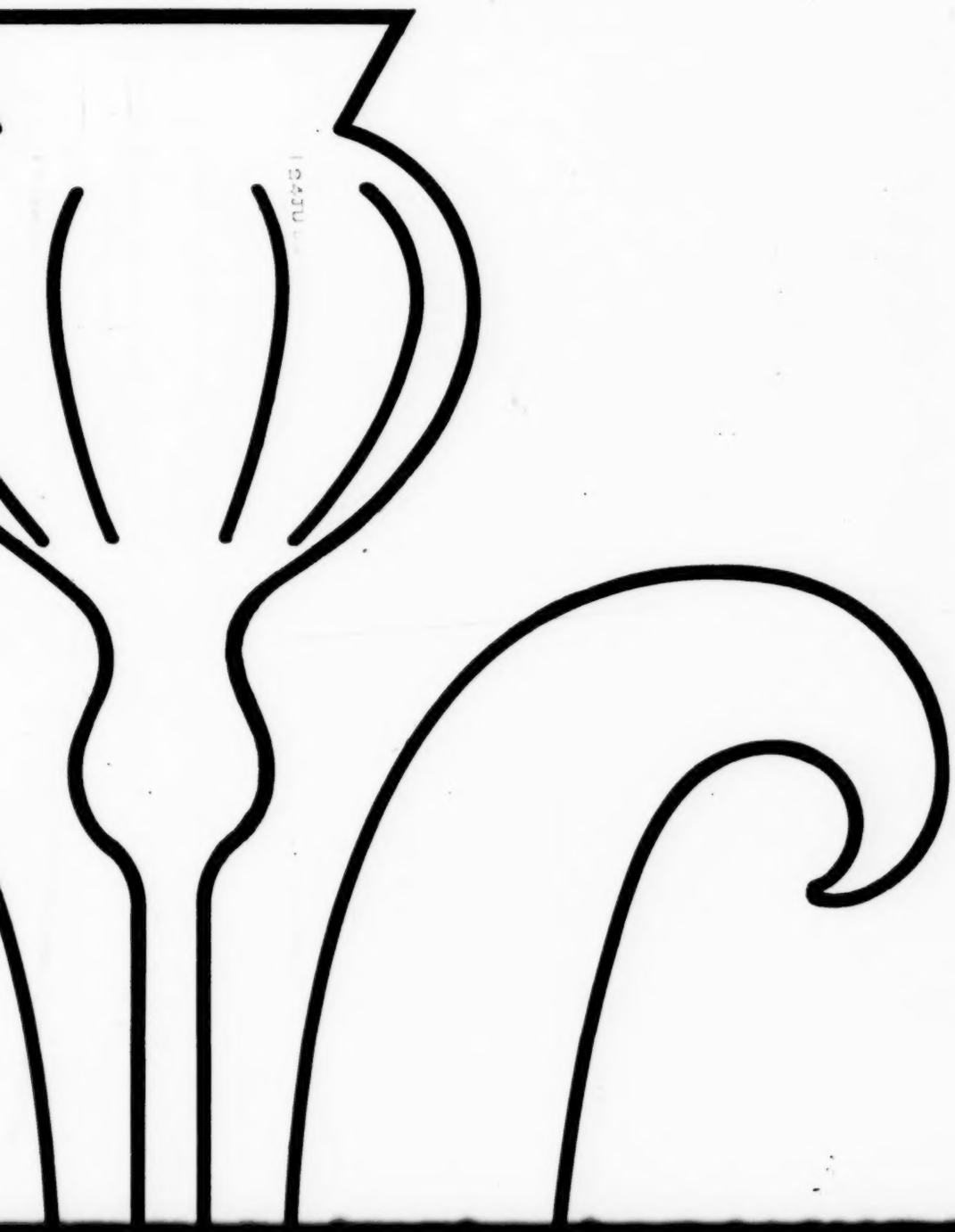

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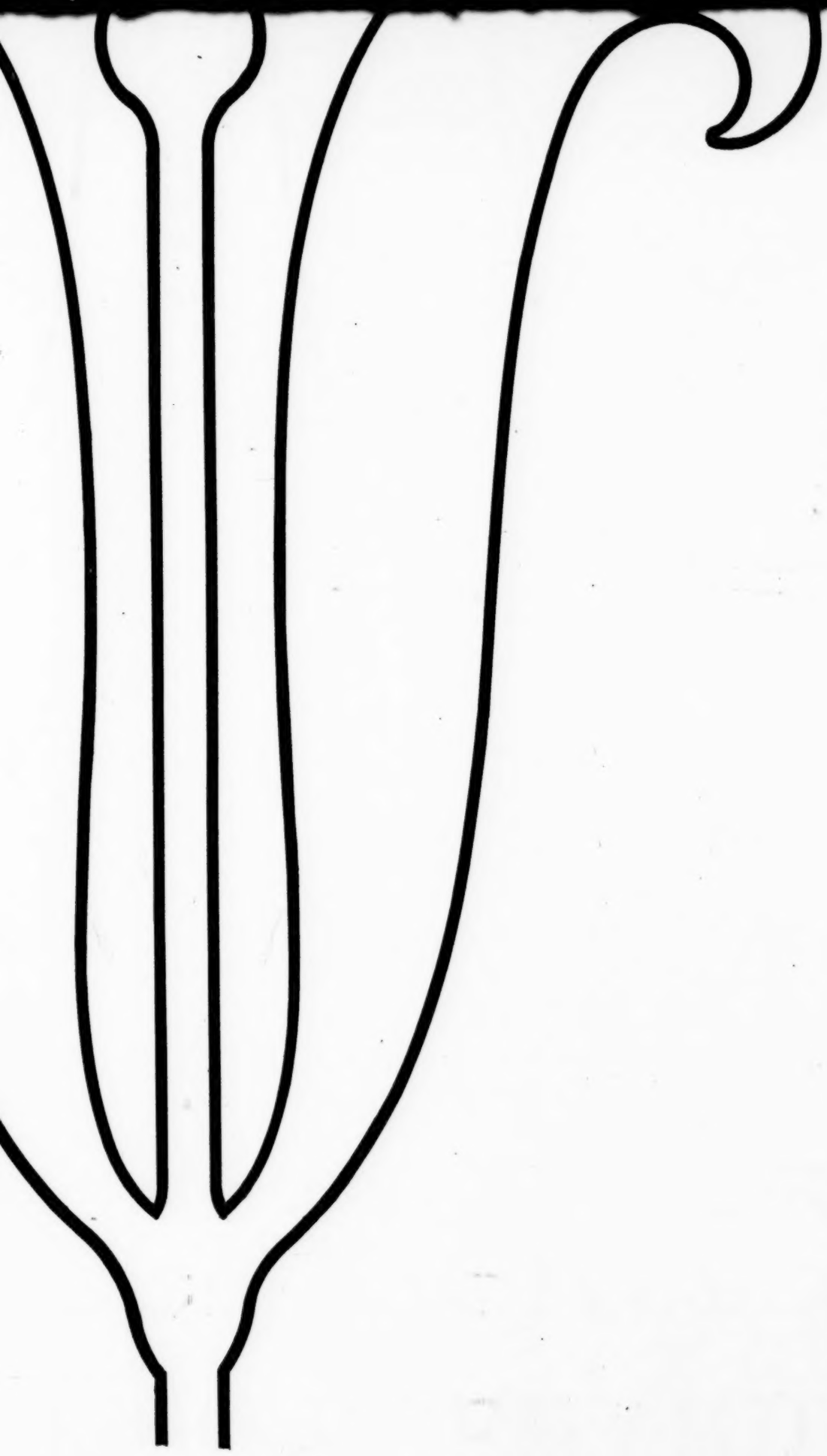

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